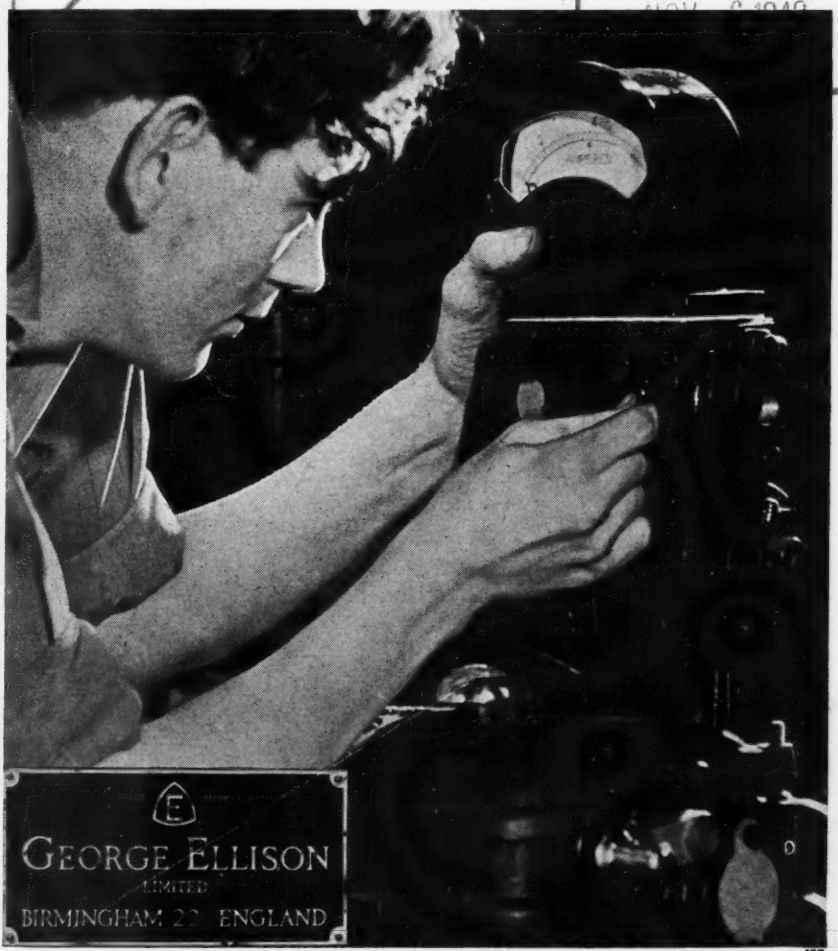
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXI. No. 3386. OCTOBER 16, 1942 6d. WEEKLY

PUBLIC LIBRARY



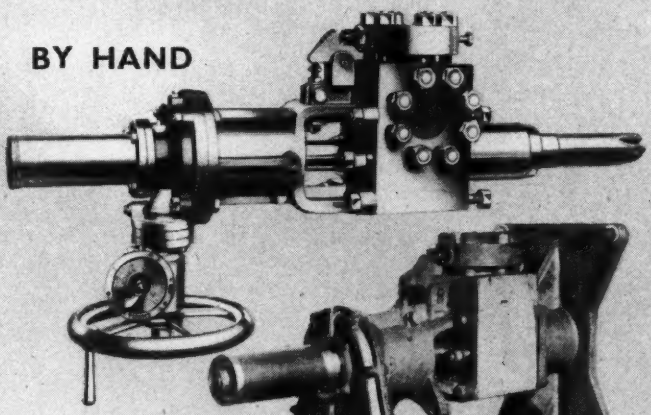
458

BABCOCK

SOOT BLOWERS

ARE CONSTRUCTED FOR OPERATION EITHER

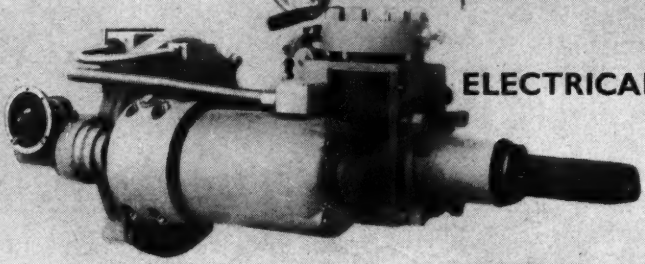
BY HAND



HYDRAULICALLY

OR

ELECTRICALLY



COMPLETE AUTOMATIC SEQUENCE CONTROL

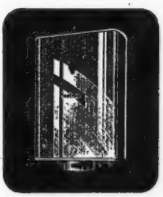
BABCOCK & WILCOX LTD., BABCOCK HOUSE, FARRINGDON ST., LONDON, E.C.4.

HEATRAE

AN ESCUTCHEON HELD HIGH FOR

FAITHFULNESS

The faithfulness of a Firm to an ideal is automatically reflected in the works of its hands.



We have been idealists for many years past, but practical idealists —as proved by the faithfulness of our products in service.

Leaders in *Electric Heating*

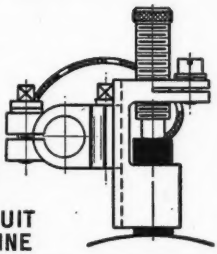
HEATRAE LTD., NORWICH • PHONE : NORWICH 25131 • GRAMS : HEATRAE, NORWICH

"WESTMINSTER"

Brush Holders

100,000 SUPPLIED

MADE TO SUIT ANY MACHINE



Dynamos and Motors Rewound and Re-constructed. "Partridge" Pressure Detectors, "Partridge" Earthing Devices, Switchgear, Photographic Arc Lamps, Electric Welders, Medical Arc Lamps

The WESTMINSTER ENG. Co. Ltd.

Victoria Road, Willesden Junction, N.W.10

Telephone: Willesden 1700-1 *Telegrams: "Regency, Phone, London."*

THE "FACILE" TERMINAL

Send for Prices and List of all kinds of Terminals

ROSS COURTNEY & CO LTD.

ASHBROOK ROAD, LONDON, N.19

MAIN JETS

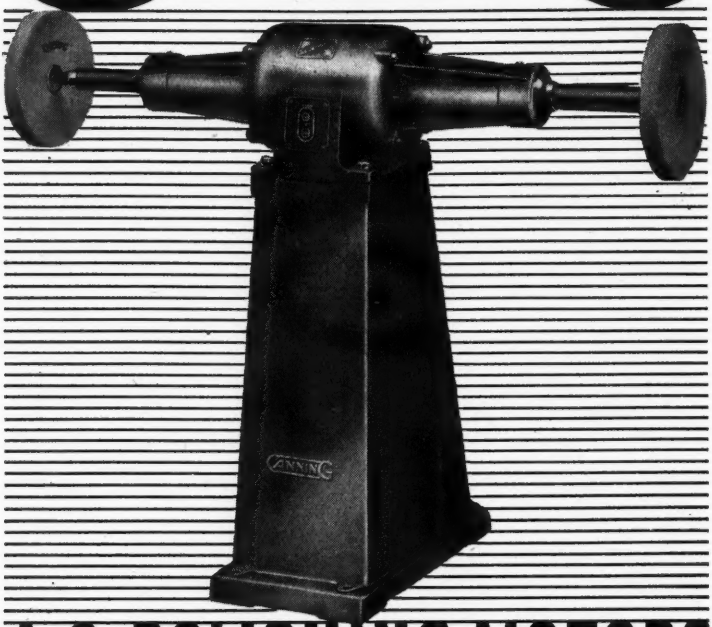
to the specific requirements of our customers.

Makers of all types of repetition products from the bar in all metals.

M.C.L. and REPETITION LTD. Pool Lane, Langley, B'ham.

A

CANNING



A·C· POLISHING MOTORS

400 volts, 3-phase, 50 cycles, 1, 2, 3, 4, and 5 h.p. 4 Bearings. Detachable spindle ends.

Clamping plates to take polishing bobs or wire wheels can be supplied.

Immediate delivery on receipt of Machine Tool Licence and contract number.

W. CANNING & Co LTD

GREAT HAMPTON STREET, BIRMINGHAM 18

NALDERS

POWER FACTOR METERS

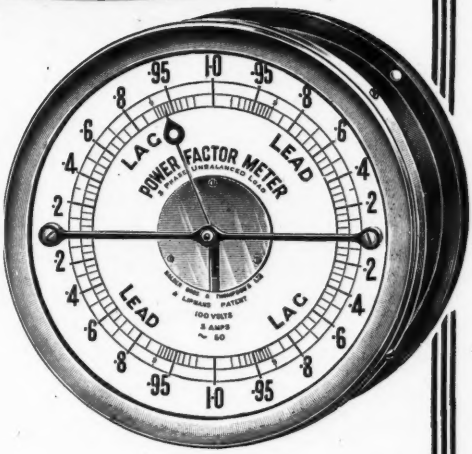


Illustration is of N.C.S. "Ideal" Power Factor Meter, Round Switchboard Pattern, to B.S. Specification, 360 deg. scale.

Independent of current, voltage frequency or temperature variations met with in commercial practice.

Low voltampere consumption.

Supplied for single phase and polyphase, balanced or unbalanced loads.

Portable Patterns also available.

When instruments are required for balanced load systems they can be arranged to operate from one current transformer if desired.

Nalder-Lipman Patents.

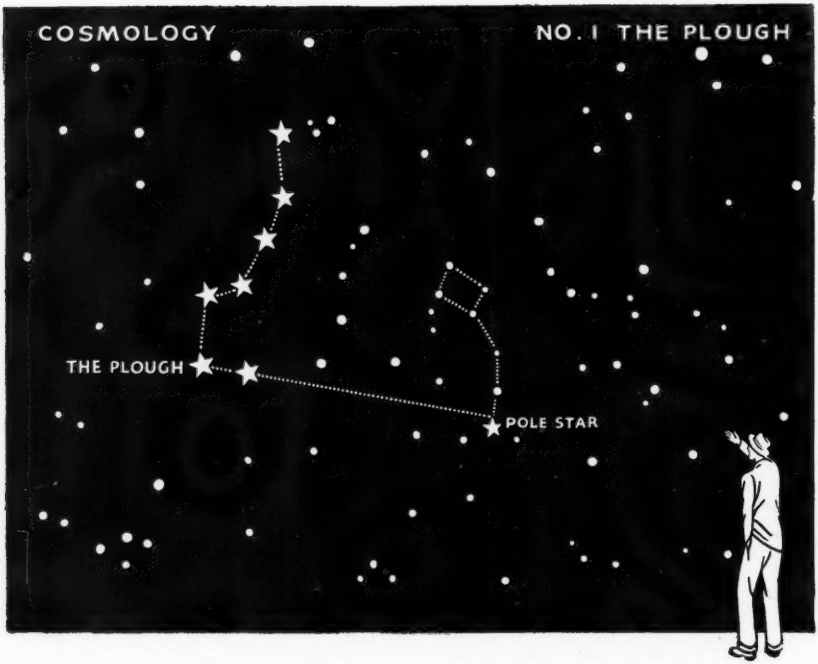
The up-to-date design, scientific accuracy and practical efficiency of all instruments sold under the N.C.S. Trade Mark guarantee the user's satisfaction.

N.C.S. PRODUCTS include all types of Measuring Instruments, Indicating or Recording, Switchboard or Portable. Also Protective Relays, Synchronisers, Circuit Breakers, Earth Leakage Trips, etc. Every unit is designed for maximum operating efficiency, reliability and durability, prices being competitive without sacrifice of quality.

Quotations on request

NALDER BROS. & THOMPSON LTD.

Telephone : Clissold 2365 (3 lines) DALSTON LANE WORKS, LONDON, E.8 Telegrams : Occlude, Hack. London



You need never lose your direction on a starry night if you learn to recognise a few of the principal "constellations" or groups of stars.

The constellation emphasised above and familiarly known as the "Plough" includes seven prominent stars, two of which act as "pointers" towards the Pole Star, which lies directly above the Earth's North Pole and is a fixed point round which the entire stellar system, including the Plough, appears to revolve slowly from East to West (once every 23 hours 56 minutes).

Although the position of the Plough, as it revolves around the Pole Star, depends on the date and time of day, you will have no difficulty in recognising it and locating the Pole Star by means of the "pointers."

THE POLE STAR LIES DUE NORTH.

COSMOS
AND
METROVICK
LAMPS
Metrovick's 'light' product
FUEL ECONOMY—
USE LESS LIGHT
BUT
USE IT *Well*
METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
NUMBER ONE KINGSWAY, LONDON, W.C.2.

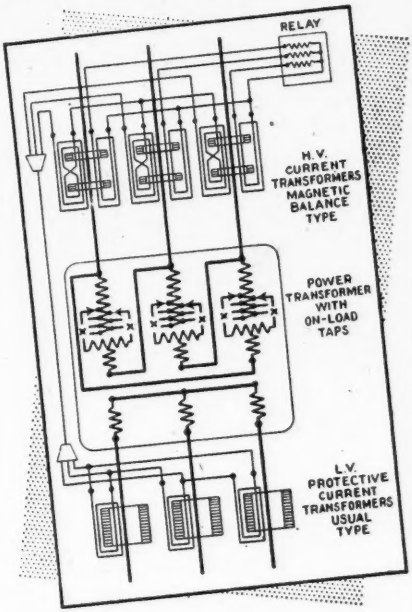
B T-H

PROTECTIVE GEAR

MAGNETIC BALANCE SYSTEM FOR POWER TRANSFORMERS

- Sensitive protection against inter-phase, inter-turn and inter-tap faults in addition to circuit faults to earth.
- Inherent stability against unbalance due to ON-LOAD tap-changing.
- Performance unimpaired by wide ratio of power transformer or small H.V. current.
- Bar primary type current transformers.
- Relays of simple and robust construction—induction type.

Extendible to "Transformer-feeders" with ON-LOAD tap-changing.


RELAY
H.V. CURRENT TRANSFORMERS MAGNETIC BALANCE TYPE
POWER TRANSFORMER WITH ON-LOAD TAPS
L.V. PROTECTIVE CURRENT TRANSFORMERS USUAL TYPE

The BTH Company manufactures a complete range of Protective Gear for all essential points of an A.C. System.

BTH THE BRITISH THOMSON-HOUSTON CO., LTD.
CROWN HOUSE, ALDWYCH, LONDON, W.C.2

A2750

AEI

NOV. 11
PLEASE GIVE GENEROUSLY
REMEMBRANCE DAY

Elasta

ELECTRIC LAMPS

E.L.M.A. LAMPS
MADE IN ENGLAND

for CONSISTENT HIGH QUALITY

The high quality of Elasta Lamps is due to the care taken in their construction. The tests made at every stage of manufacture ensure that this high standard is uniformly consistent, resulting in Elasta Lamps giving

CORRECT LIGHT ALL THE TIME

POPE'S ELECTRIC LAMP CO., LTD.

5, EARNSHAW STREET, NEW OXFORD ST., LONDON, W.C.2

Telephone : TEMple Bar 6074. *Telegrams :* "Duramentum, Westcent, London."

Branches holding stocks from which supplies can be obtained :

MANCHESTER :
18 Pool St., Market Street.
Tel. : Deansgate 5687.
Grams :
"*Pope's, Deansgate* 5687."

LEEDS :
6 Park Square.
Tel. : Leeds 22119.
Grams :
"*Pope's, Leeds* 22119."

LEICESTER :
89 London Road.
Tel. : Leicester 59028.
Grams :
"*Pope's, Leicester* 59028."

BIRMINGHAM : 3 Grosvenor Chambers, Broad St. Corner, Broad Street.
Tel. : Midland 2580.
Grams : "*Pope's, Midland* 2580, *Birmingham.*"

LIVERPOOL :
Mr. B. Marks,
29 Lascelles Road
Liverpool 19

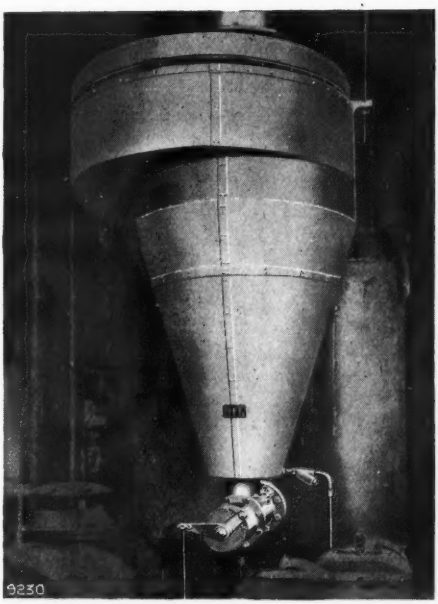
BRISTOL :
123 Victoria Street.
Tel. : Bristol 23239.
Grams : "*Pope's, Bristol* 23239."

BELFAST (Managers : Campbell, Gardner & Co.) : 27 Franklin Street.
Tel. : Belfast 25171 *Grams :* "*Camergard, Belfast.*"

INDUSTRIAL DUST PROBLEMS

THE STURTEVANT T.L. HIGH EFFICIENCY CYCLONE DUST COLLECTOR

has almost unlimited applications



Sturtevant T. L. Cyclone in a Food Factory

- The salvage of processing losses
- Collecting the dust caused in machining processes or material handling plant
- Collecting the dust from chemical plant and metallurgical furnaces
- Cleaning gases from stoker fired boilers

Full details are in our post free publication U1161

STURTEVANT ENGINEERING CO. LTD.
25. WORCESTER ROAD, SUTTON, SURREY.

C7

Back Room Boys and

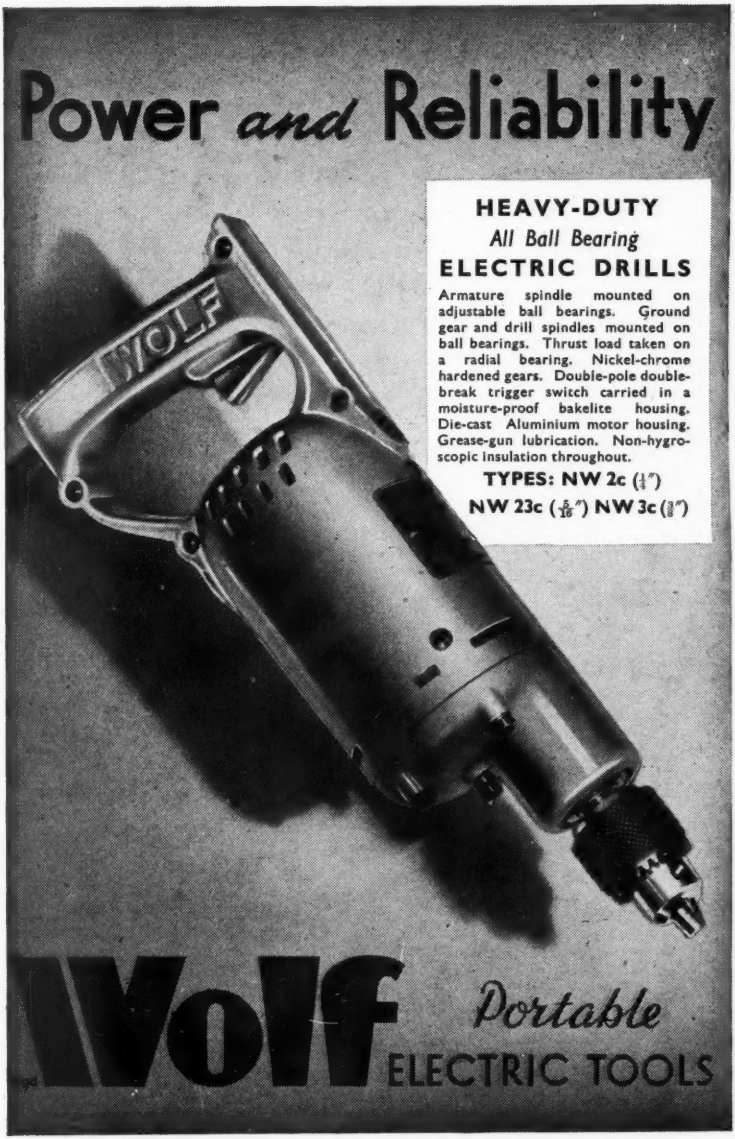
COPPER PROBLEMS

You have your 'back room boys' engaged in solving many a knotty problem. In respect of all problems connected with the application of copper and copper alloys, you can lighten their task considerably, and possibly speed up production, by enlisting the assistance of the Copper Development Association, whose fully qualified professional and technical advisers are men who have made a life study of copper.

COPPER DEVELOPMENT ASSOCIATION

A non-trading organization, maintained by the British Copper Industry to supply information and advice, free, to all users of copper.

GRAND BUILDINGS, TRAFALGAR SQUARE, LONDON, W.C.2
and 9 Bilton Road, Rugby


Power and Reliability
HEAVY-DUTY
All Ball Bearing
ELECTRIC DRILLS
Armature spindle mounted on adjustable ball bearings. Ground gear and drill spindles mounted on ball bearings. Thrust load taken on a radial bearing. Nickel-chrome hardened gears. Double-pole double-break trigger switch carried in a moisture-proof bakelite housing. Die-cast Aluminium motor housing. Grease-gun lubrication. Non-hygroscopic insulation throughout.
TYPES: NW 2c (1/4")
NW 23c (5/16") NW 3c (3/8")
WOLF
Wolf Portable ELECTRIC TOOLS

S. WOLF & CO., LTD., PIONEER WORKS, HANGER LANE, EALING, W.5. PERivale 5631-3

4895

Because PREMIER is, for obvious reasons, severely restricted in the production of its own Fine-Quality, it presents some little gems of fine quality from the books of our day

"It'll do!"

My work in the theatre has taught me many lessons, but the most important is that only the best is good enough.

We all choose for ourselves certain rules of life, though we do not always keep them. We are all human, and often fail to reach the standards at which we aim. But the important thing is to aim high. I have always found that my most successful productions have been those with which I have aimed highest and taken most trouble. My failures have mostly been those of which I could not honestly say that they satisfied me.

The worst fault in the theatre is the tendency to slacken off just when one's most strenuous efforts are needed to ensure a satisfactory finish. "It'll do" is an evil phrase, far too common. It is a poisonous drug, and responsible for all the faulty work done in the home, the shop, the factory and the theatre.

From "COCK-A-DOODLE-DO" by Charles B. Cochran. (Reproduced by kind permission of the publishers, J. M. Dent & Sons Ltd.)

PREMIER *Fine-Quality*

electric heating appliances, including the famous "Laundwell" and "Smoothwell" electric irons; "Quickset" and "Pylon" electric kettles; electric fires; toasters; coffee percolators; multi-boilers, glue-pots and other appliances.

PREMIER ELECTRIC HEATERS LIMITED · BIRMINGHAM, 9

RECOGNIZED STANDARDS OF EXCELLENCE...

FERRANTI *Meters*

FM78

FERRANTI LTD. Hollinwood, Lancs. ***London Office:* Bush House, Aldwych, W.C.2**

'BELLING' ELECTRIC FIRES AND COOKERS

Available only for essential war purposes

'Belling'

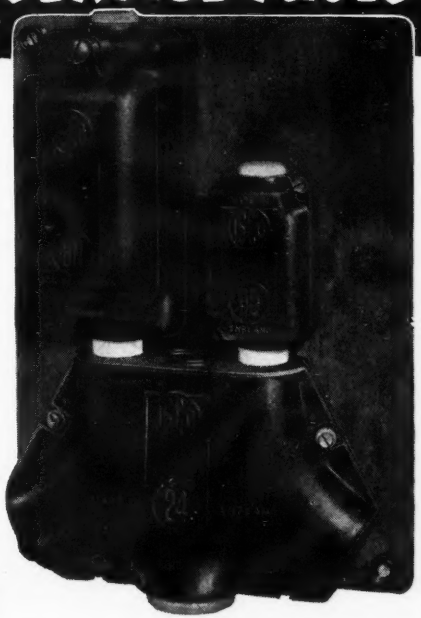
BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX • 'Phone: HOWARD 1212

C.R.C. 315

HEAVY DUTY SERVICE FUSES for CARTRIDGE FUSES

Porcelain Carrier

Wedge type Cartridge Fuse



NEUTRAL CONNECTOR BOXES

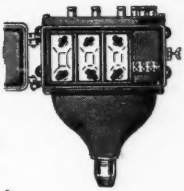
Single or Three-way

SEALING CHAMBERS

Two-pole or Four-pole Triple-Entry

Above : Indoor ISCO

4-POLE ISCO
Below : Outdoor ISCO

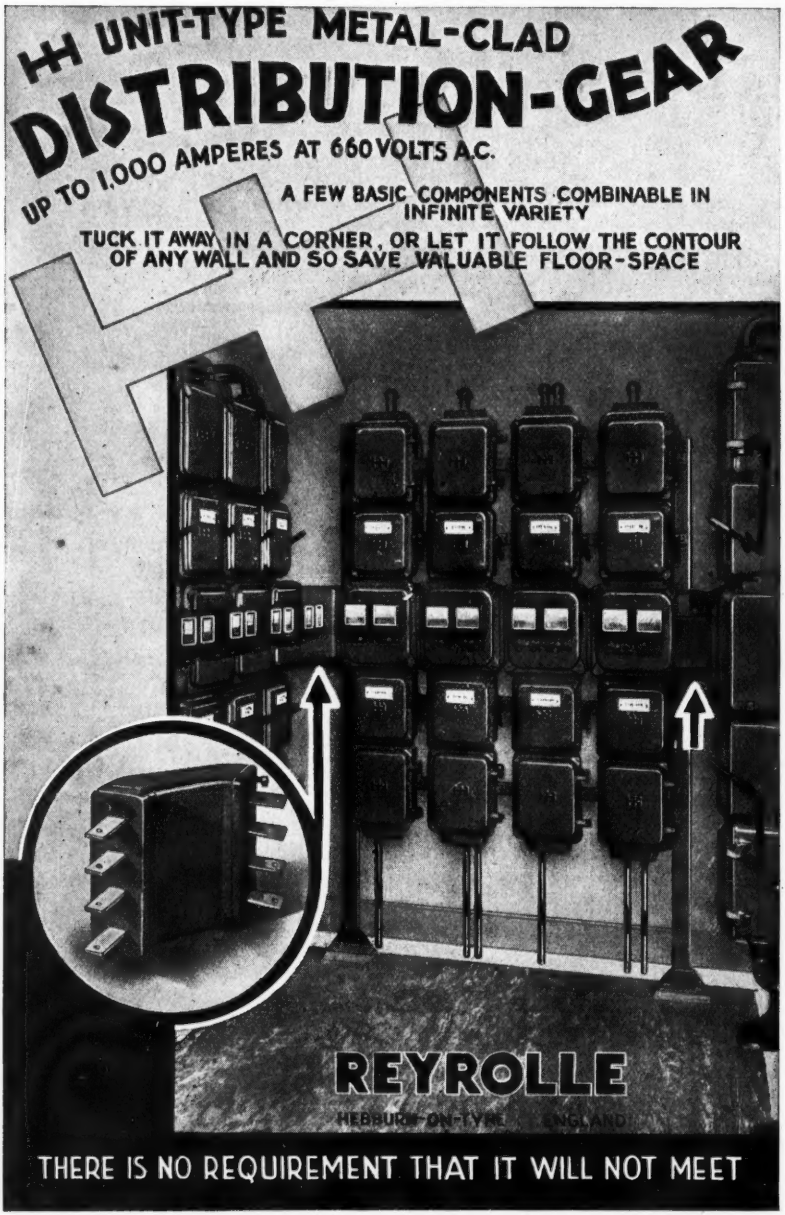


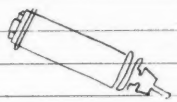
The range of ISCO IRONCLAD SERVICE FUSES fitted with Wedge type Cartridge Fuses embodies all those technical features which make for maximum reliability under the most severe conditions. Please write for details.

TRADE **ISCO** MARK

The Super Cut-out

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
MILTON COURT · WESTCOTT · DORKING · SURREY
PHONE: DORKING 3241 (10 LINES)
TELEGRAMS: HENLETEL, DORKING


UNIT-TYPE METAL-CLAD
DISTRIBUTION-GEAR
UP TO 1,000 AMPERES AT 660 VOLTS A.C.
A FEW BASIC COMPONENTS COMBINABLE IN INFINITE VARIETY
TUCK IT AWAY IN A CORNER, OR LET IT FOLLOW THE CONTOUR OF ANY WALL AND SO SAVE VALUABLE FLOOR-SPACE
REYROLLE
HEBBURN-ON-TYNE ENGLAND
THERE IS NO REQUIREMENT THAT IT WILL NOT MEET



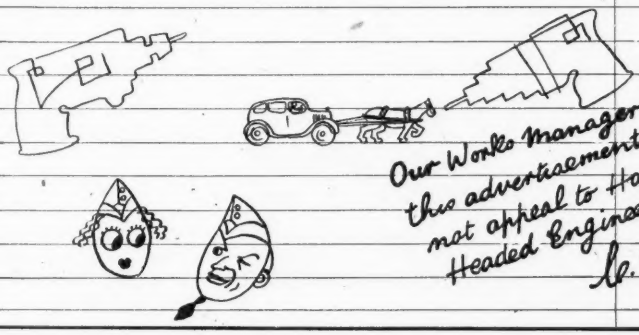
10/10

(PROBLEM XXIII. ***Write on one side of the paper only. No cribbing. Draw a map and state your reason. If you wish you may send a 6d. Postal Order.***)

A, B, C and D are four engineers. D is an A.C.2 in the R.A.F. with a C.3 brain and an A.1 girl in the A.T.S. The others work in munitions doing this, that and the other. Now do you all know each other? Then here goes: When A is using a certain portable drill he can drill as many holes as any two of the others put together. But so could any of the others if they could get hold of the drill. Unfortunately A is a big man and throws dirty looks and dark curses at anyone who tries to touch this particular tool. B and C are very fed up about this. D doesn't care because his mind is on his girl instead of his work. The problem is why can't B, C and D have Desoutter Tools as well as—*dash it, we've gone and given the answer away. What? You knew all the time?*

a + b + c + d = £s all! who cares.

Poor B.



Our Works Manager says this advertisement will not appeal to Hard Headed Engineers.. M. D.

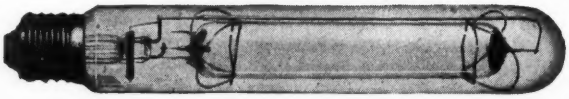
DRILL GUNS · SCREWDRIVERS · NUTRUNNERS · SHEARS · GRINDERS · COUNTERSINKING TOOLS
BOLT MILLING TOOLS · DESOUTTER BROS. LTD., DEPT. R, THE HYDE, HENDON, LONDON, N.W.9
TELEPHONE: COLINDALE 6346-7-8-9 TELEGRAMS: DESPNUCO, HYDE, LONDON

C.R.C.128

—but still have ample light for vital work

Economy in coal is imperative. That means economy in current. It is everyone's duty to save current, but not at the expense of light, which is essential to efficient production. How, then, can it be done? By installing Crompton Discharge Lamps. They give the same amount of light for very much less current. What is more, they give a quality of light that is highly efficient for most industrial work and by lasting longer they reduce lamp maintenance. In the National interest, as much as your own, install Crompton Discharge Lamps.

CROMPTON
MERCURY VAPOUR
DISCHARGE LAMPS



LET THE CROMPTON LIGHTING SERVICE PLAN *YOUR LIGHTING*

CROMPTON PARKINSON LTD., ELECTRA HOUSE, LONDON, W.C.2.

Telephone: Temple Bar 5911 *Telegrams: CROMPARK, ESTRAND, LONDON*

TANGENT

"Tangent" Products include

SOUND SIGNALS
LUMINOUS CALL SYSTEMS
STAFF LOCATORS
MINING SIGNALS
FIRE, BURGLAR AND BANK RAID ALARMS
TELEPHONES
INTERPHONES
WATCHMAN'S CLOCKS
ELECTRIC
IMPULSE CLOCKS
SYNCHRONOUS CLOCKS
STRIKING, CHIMING AND TOLLING MECHANISM
LIQUID-LEVEL
INDICATING
RECORDING AND
ALARM APPARATUS
IDLE-MACHINE AND OUTPUT RECORDERS
SPECIAL APPARATUS

CONFIDENCE

is the keynote on which the reputation of "TANGENT" Apparatus has been built. Expertly designed and of sound construction, it commands confidence—for 70 years it has held a pre-eminent place in the Electrical industry and has gained confidence. "TANGENT" Apparatus is fulfilling many important duties and will continue to contribute to the progress of Industry.

For priority work good deliveries can be given.

GENTS' OF LEICESTER ESTAB. 1872

GENT & CO. LTD., Faraday Works, LEICESTER

Also at LONDON • NEWCASTLE-ON-TYNE • GLASGOW • BELFAST • DUBLIN

FOR THE
ELECTRICAL INDUSTRY

A.I.D. APPROVAL No. 2583/42

AVAILABLE IN THICKNESSES .003", .0035", .005"
IN WIDTHS FROM $\frac{1}{8}$" TO 1" IN WHITE & COLOURS

USE IT FOR

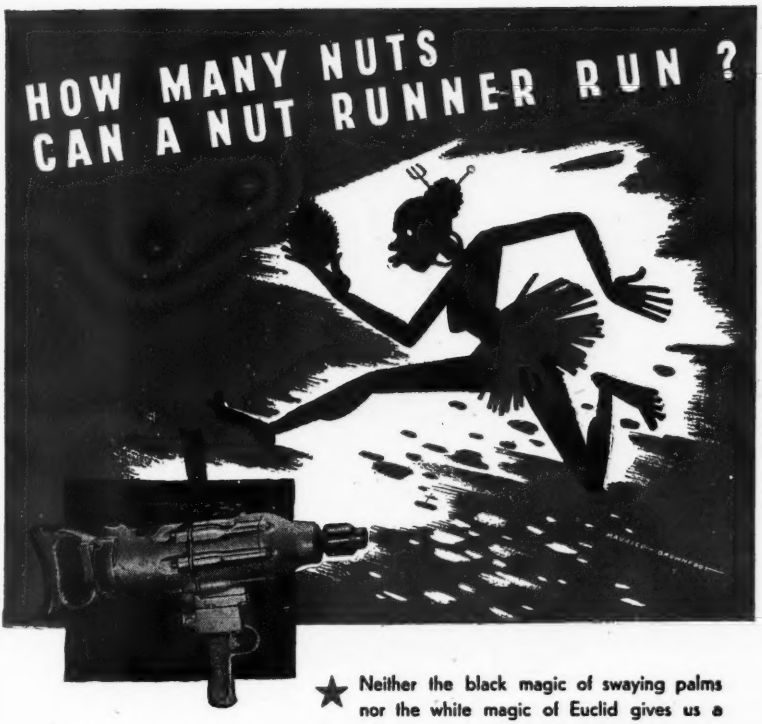
Cable Identification, Cable Jointing, Winding Coils in Electric Motors, Interleaving Wires in Transformers, Cable Harness for Aircraft, Tanks, etc. General Factory Maintenance

.003" and .0035" TAPES AS A SUBSTITUTE .. FOR SILK TAPE FOR INSULATION ..

Numbered Tapes for identifying cores in multiple cables

P.P. PAYNE & SONS LTD

HAYDN ROAD NOTTINGHAM *Phone*: 64335
BUSH HOUSE LONDON *Phone*: TEMple Bar 6356



★ Neither the black magic of swaying palms nor the white magic of Euclid gives us a clue—there are small nuts and large nuts, hexagon nuts, square nuts, coconuts and just nuts. The little lady may have her own reasons for running a nut. Who cares? The champion nut runner is always a B. & D. We get more milk out of the coconut and keep your production running—

This is only one of the wide range of Portable Electric Tools which we manufacture.

Write for Catalogue 1.39

Quicker and better with

Black & Decker

PORTABLE ELECTRIC TOOLS

BLACK & DECKER LTD · HARMONDSWORTH · MIDDX

'PHONE WEST DRAYTON 2681/5 'GRAMS "BLACDECK," WEST DRAYTON

BRANCH SERVICE STATIONS AT BIRMINGHAM, BRISTOL, GLASGOW, LEEDS, MANCHESTER AND NOTTINGHAM

Smee's

GLOVERS CABLES

HAVE A REPUTATION DATING BACK TO THE YEAR 1868

W. T. GLOVER & CO. LTD.

TRAFFORD PARK, MANCHESTER 17

YOU'RE ALL SET FOR SPEEDIER PRODUCTION

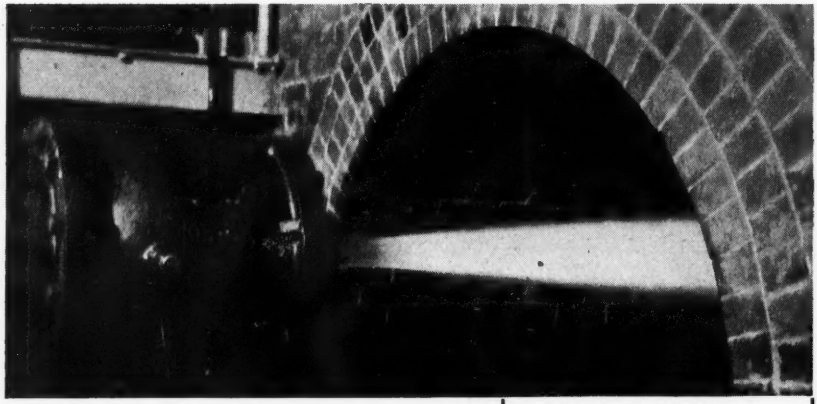
When it is a question of speeding production, Tru-Wel Tubes should always be taken into account. Tru-Wel Tubes are the electrically welded steel tubes made by Tube Products Limited. These are tubes of highest quality, made by quantity production to keep costs down; tubes you can depend on for wall strength and concentricity. They can be easily manipulated, and offer a surface fine enough even for decorative uses.

TUBE PRODUCTS LIMITED

TUBE INVESTMENTS LIMITED, STEEL TUBES ADVISORY CENTRE, ASTON, BIRMINGHAM. Manufacturers who need advice or information on any job where steel tubes might help, will find The Steel Tubes Advisory Centre ready to assist them in every possible way.

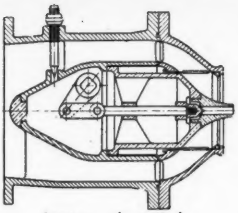
T.4e

STREAMLINE VALVES....

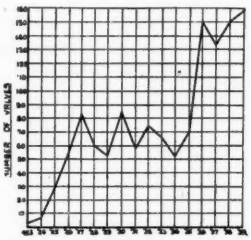


One of the most important of all recent valve developments has been that of the Larner-Johnson streamline plunger valve. Originally produced for Hydro-electric turbine control, its immense possibilities for Waterworks were rapidly realised. At the outbreak of war there were 1,200 Larner-Johnson installations (exclusive of valves manufactured in North America or by our sub-licensees in Europe outside Britain), in the fullest range of sizes.

The valve has been applied with signal success not only to special problems and unusual conditions, but to nearly all valve duties, including free-discharge control, pressure reduction, non-return duty on pumping plant, as relief valve, float valve, emergency self-closing valve, and ordinary manual stop valve and regulator. For each of these duties the Larner-Johnson form has special advantages to offer, and no investigation of valve equipment to-day is complete without full consideration of its unique features and possibilities.



Section of typical Larner-Johnson valve.



Curve showing progress of Larner-Johnson valve up to the outbreak of war.

BLAKEBOROUGH

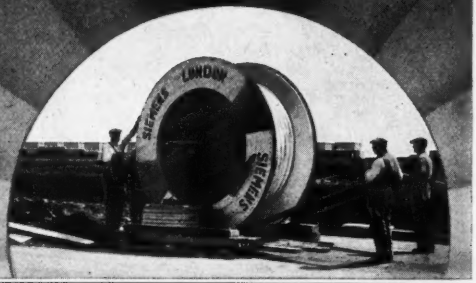
J. BLAKEBOROUGH & SONS, LTD., BRIGHOUSE, ENGLAND

SIEMENS CABLES

CONTRACTORS FOR THE
MANUFACTURE & LAYING
OF ALL TYPES OF
ELECTRIC CABLES
FOR
POWER SUPPLY MAINS

We have a world-wide experience in the laying and jointing of all types of underground and underwater cables.

Let us advise you on your next cable problem



SIEMENS BROTHERS & Co., LTD
WOOLWICH, LONDON, S.E.18

ESTABLISHED 1858 Telephone: WOOLWICH 2020

Other manufactures: V.I.R. Wires & Cables of all classes

1898 — 1942

The title under this old print was "Cable Braiding." What a picture of the more leisurely Victorian era which most of us but dimly remember!

Compare this with the alert pose of the modern worker at her up-to-date braiding machine. How apparent is the progress which has been made during the intervening years!

Standard
POWER CABLES

Advertisement of Standard Telephones and Cables Limited, North Woolwich, E.16

TRADE MARK
HIGGS MOTORS
GOVERNING DIRECTOR WALTER F. HIGGS, M.I.E.E. LTD.
BIRMINGHAM, 6 ENGLAND

SLOW BUT SURE

During these times when strenuous effort is being made to accelerate the tempo of industry it may hardly seem relevant to record the merits of a machine which does its work at a slower than usual pace.

Nevertheless HIGGS GEARED UNITS are making a valuable contribution to our cause and for most slow-speed drives they perform with unparalleled efficiency and economy.

Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Nottingham, Peterborough, Sheffield, Wolverhampton.

An improbability

The problem of high temperature operation in electrical machinery has always been very evident to the manufacturer of the insulated conductor and the many years of research given to the perfection of a wire insulation able to resist heat while maintaining other desirable electrical properties resulted in the trial appearance of a "Lewcos" (reg.) glass insulated wire.

that became a fact

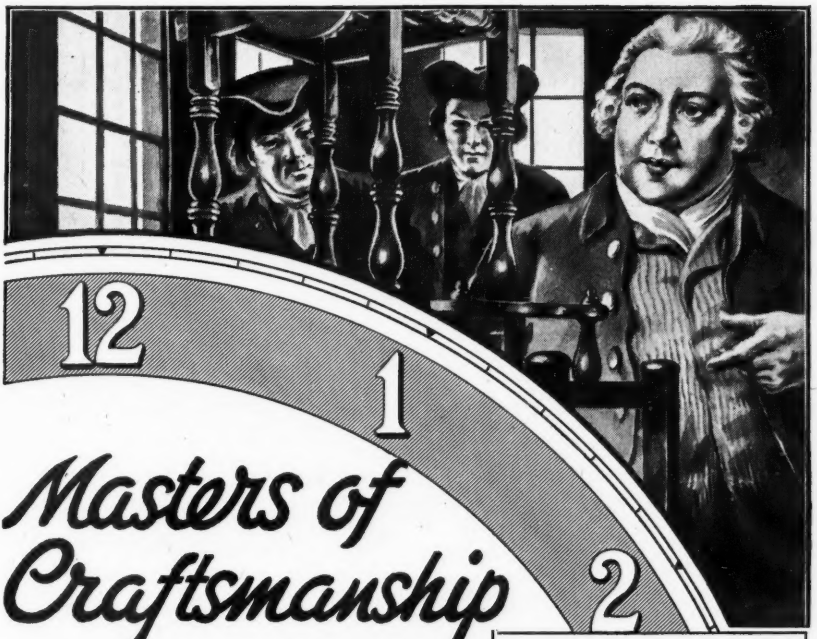
Such a departure in winding wires was regarded by some, perhaps not unnaturally, as a doubtful hope built on glass—it did not seem possible that a wire could be insulated with glass fibre yet have flexibility—space factor and normal handling properties comparable with other types of insulated wires generally used for coil winding.

and now a success

That was three years ago, but since that time practical experience has proved that "Lewcoglass" insulated wire can be used under normal winding shop conditions, and that its high di-electric strength, good space factor and flexibility has enabled designers to make improvements on electrical machinery and apparatus which have to withstand high temperatures.

"Lewcoglass" is now available in all sizes of round wire between .010" and .144".

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS, LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10



Masters of Craftsmanship

The Lancashire firm of Ferranti Ltd. were pioneers in the electrical field. Their productions are known over all the globe. Electrical equipment bearing their name is giving reliable performance in the furthermost corners of the world.

The description, Masters of Craftsmanship, may well be ascribed to men inspired by the ideals of its founder, ideals which prescribe one degree of quality, and one only—superlative.

Among the many achievements of Ferranti Ltd. is the Ferranti Clock—a model of accuracy and dependability.

SIR RICHARD ARKWRIGHT
1732—1792.

A native of Preston. His flair for mechanical invention resulted in an improved cotton-spinning machine which could produce yarns not only suitable for warp, but fine enough for weft. His invention made mechanical weaving possible, and laid the foundation of Lancashire's cotton industry. He became a manufacturer on a large scale, in 1771 establishing the first spinning-mill worked by water-power.

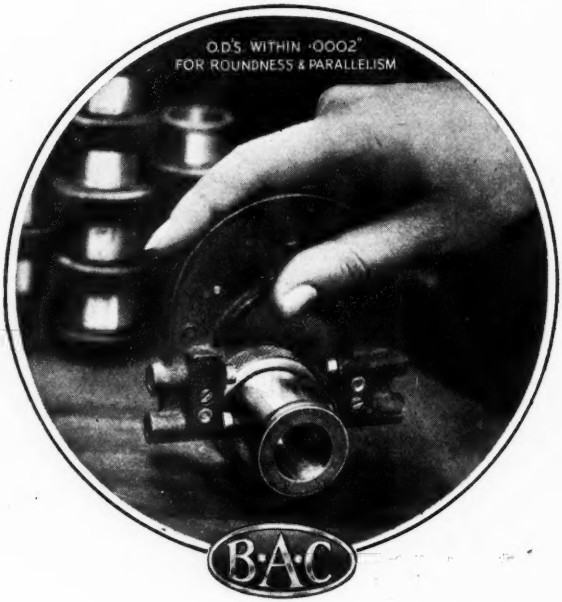
Truly a
MASTER OF CRAFTSMANSHIP.

FERRANTI *Clocks*

FERRANTI LTD., HOLLINWOOD, LANCS
LONDON : BUSH HOUSE, ALDWYCH, W.C.2

British Aero Components Ltd.

HINCKLEY

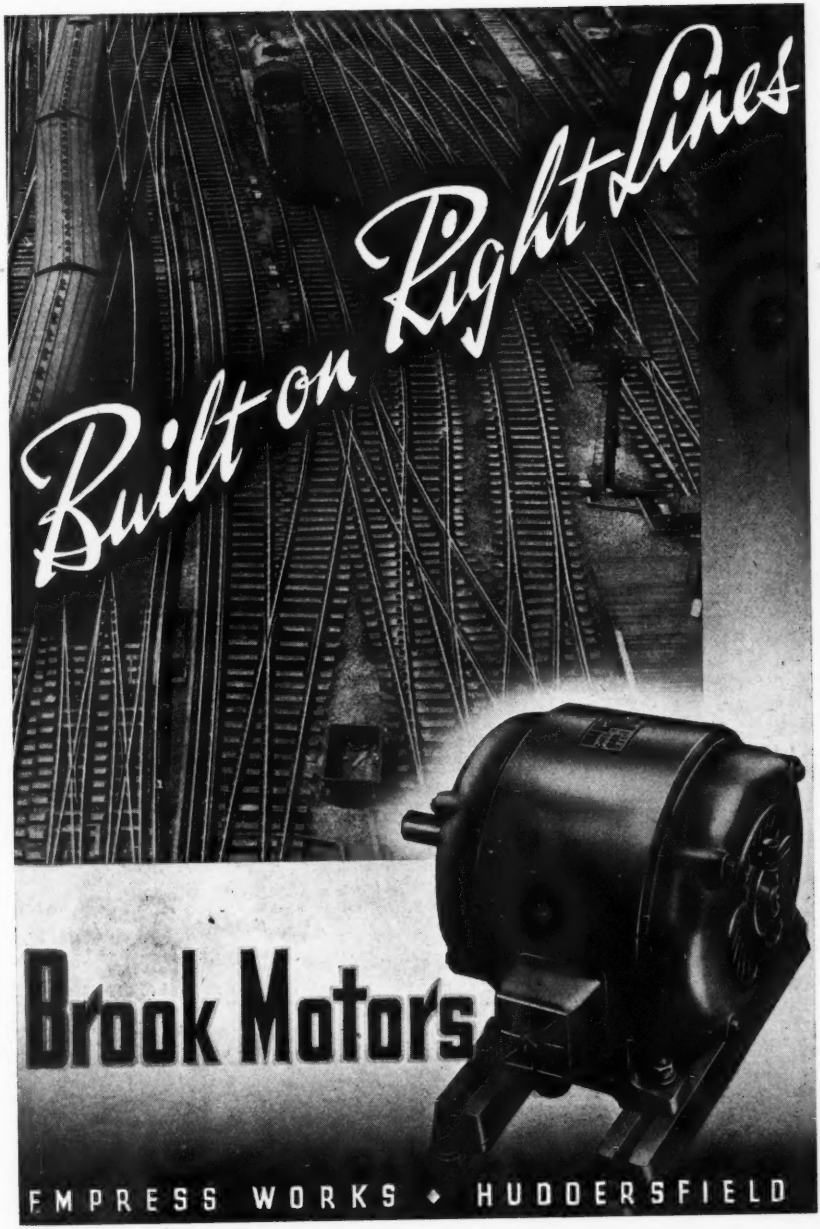


PRODUCTS OF
TOOLROOM
ACCURACY

Standardised Drill Bushes *Sodium Cooled Valves*

STANDARDISATION····· *the first essential for economical production*

COGENT

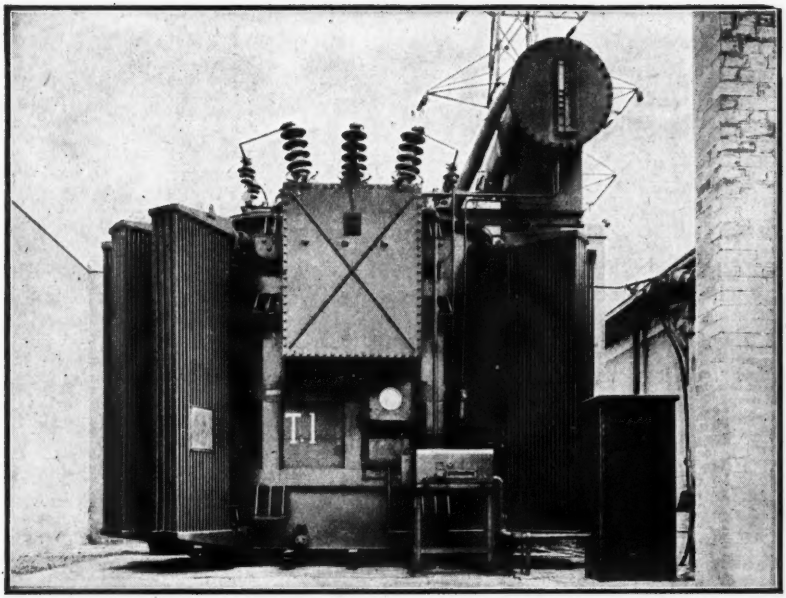

Built on Right Lines
Brook Motors
EMPRESS WORKS • HUDDERSFIELD

CRYSELCO

"Current" "Saving Bonds". Buy them!

CRYSELCO LIMITED BEDFORD

PARSONS



TRANSFORMERS

THE SOUND AND WORKMANLIKE CONSTRUCTION WHICH CHARACTERISES ALL PARSONS TRANSFORMERS IS A DIRECT RESULT OF MANY YEARS' EXPERIENCE IN MANUFACTURE AND OPERATION

The illustration shows a 10,000 kVA 33/11 kV 3-phase PARSONS TRANSFORMER. This unit is fitted with on-load voltage regulating equipment to give a range of +3% to —10½% of the normal primary voltage (33 kV) in nine 1½% steps.

C.A. PARSONS

& COMPANY LTD

NEWCASTLE-ON-TYNE

LONDON : 56 VICTORIA STREET, S.W.1

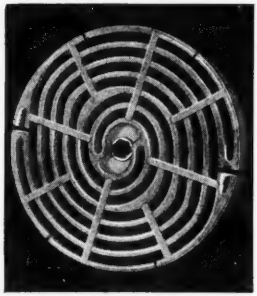
I.P.S.—P 15483.

TRADE MARK

Announcing the SESAME BOILING PLATE

PATENT APPLIED FOR

(8-inch Open Type)



For replacement on electric cookers.

This new boiling plate has been developed to meet an emergency and to relieve the delivery situation of existing types occasioned by present manufacturing difficulties.

Salient features are—

- Interchangeable with all 8-inch round plates supplied by the undermentioned cooker and boiling plate manufacturers.
- Loading 1,750 watts.
- Speed of boiling comparable with existing types of plates (3-pints in 13½ minutes with average pan).
- Arranged for 3-heat control.
- Element coils easily replaceable.
- Design based on latest scientific principles.

There will be TWO types—
TYPE "S" to replace SOLID plates. (Available immediately.)
TYPE "R" to replace RADIANT plates. (Available shortly.)
When ordering specify type required.

This, being an emergency plate, does not carry the manufacturers' usual guarantee.

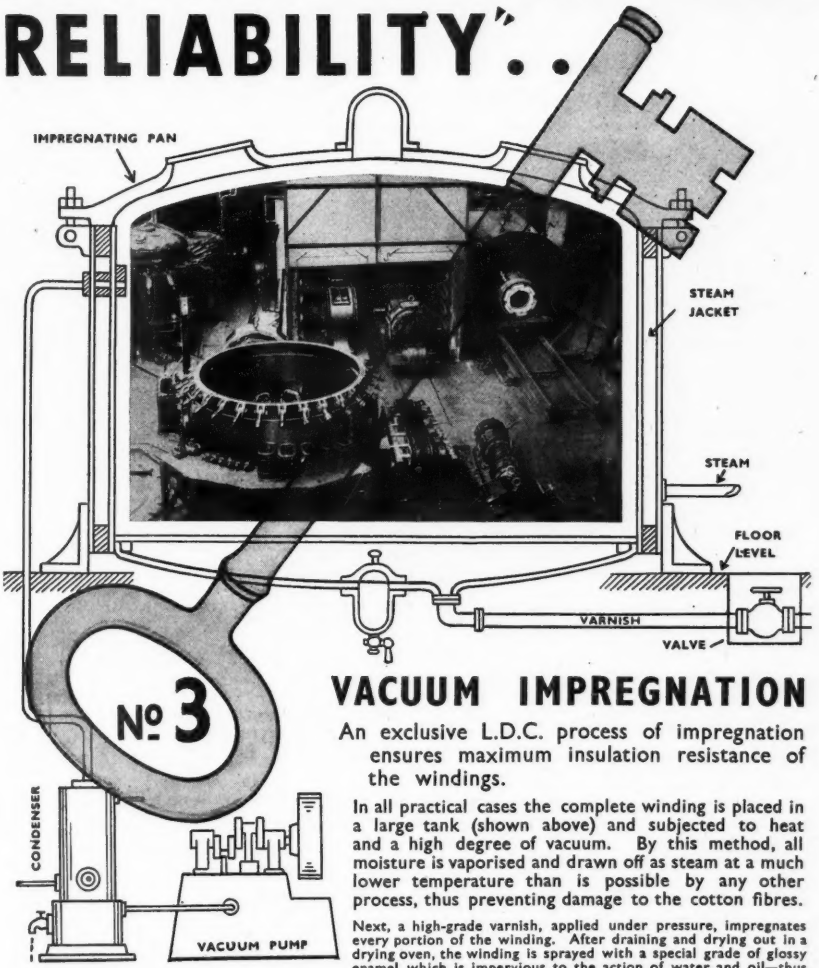
THIS ANNOUNCEMENT IS MADE BY—

BELLING & CO., LTD.
De BRUNNER & LANG-SIMS
ELEXCEL LTD.
THE ENGLISH ELECTRIC CO., LTD.
THE GENERAL ELECTRIC CO., LTD.
THE HOTPOINT ELECTRIC APPLIANCE CO., LTD.
THE JACKSON ELECTRIC STOVE CO., LTD.
METROPOLITAN-VICKERS ELECTRICAL CO., LTD.
REVO ELECTRIC CO., LTD.
SIMPLEX ELECTRIC CO., LTD.

NOTE:—*The Trade is asked to accept this notification because, in order to save paper in the national interest, this information will not be circularised.*

SESAME—Trade Mark Registration applied for.

KEYS TO L.D.C. "LASTING RELIABILITY"..



VACUUM IMPREGNATION

An exclusive L.D.C. process of impregnation ensures maximum insulation resistance of the windings.

In all practical cases the complete winding is placed in a large tank (shown above) and subjected to heat and a high degree of vacuum. By this method, all moisture is vaporised and drawn off as steam at a much lower temperature than is possible by any other process, thus preventing damage to the cotton fibres.

Next, a high-grade varnish, applied under pressure, impregnates every portion of the winding. After draining and drying out in a drying oven, the winding is sprayed with a special grade of glossy enamel which is impervious to the action of water and oil—thus the winding is completely sealed.

LANCASHIRE DYNAMO & CRYPTO LTD

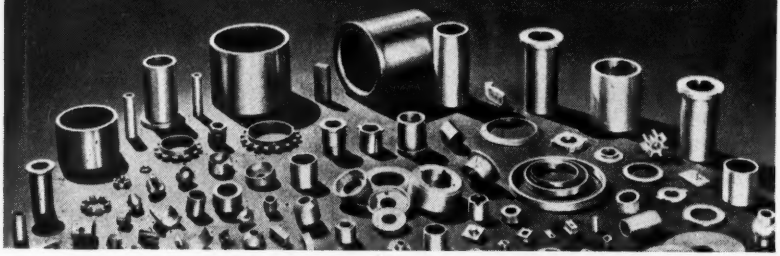
TRAFFORD PARK, MANCHESTER, 17. WILLESDEN, LONDON, N.W.10.

MANUFACTURERS OF ELECTRIC MOTORS SINCE 1899

Associated Companies :- FOSTER TRANSFORMERS & SWITCHGEAR LTD., SOUTH WIMBLEDON, S.W.19. • CRYPTON EQUIPMENT LTD., WILLESDEN, N.W.10.

5 ADVANTAGES of COMPO H

OIL-RETAINING BRONZE BEARINGS



1 **SAVING IN MATERIAL.** Compo Bearings are die pressed to finished dimensions. No scrap metal from machining.

2 **SAVING IN TIME.** No machinery is necessary. Compo Bearings are finished with a mirror surface.

3 **SAVING IN MACHINE TOOLS.** The high quality finish of die pressed Bearings eliminates the use of lathes and equipment, releasing them for other work.

4 **SAVING IN INSTALLATION COSTS.** Our recommended low cost assembly methods save much of the installation costs of ordinary bearings.

5 **SAVING IN SERVICE COST.** The excellent wear characteristics of the metal composition of Compo Bearings ensures trouble-free operation and very long life.

Write for a copy of the "Compo H" brochure, which gives more detailed information of the composition and application of these bearings. If you have a problem concerning remote or inaccessible bearings our Service Department can probably help you.

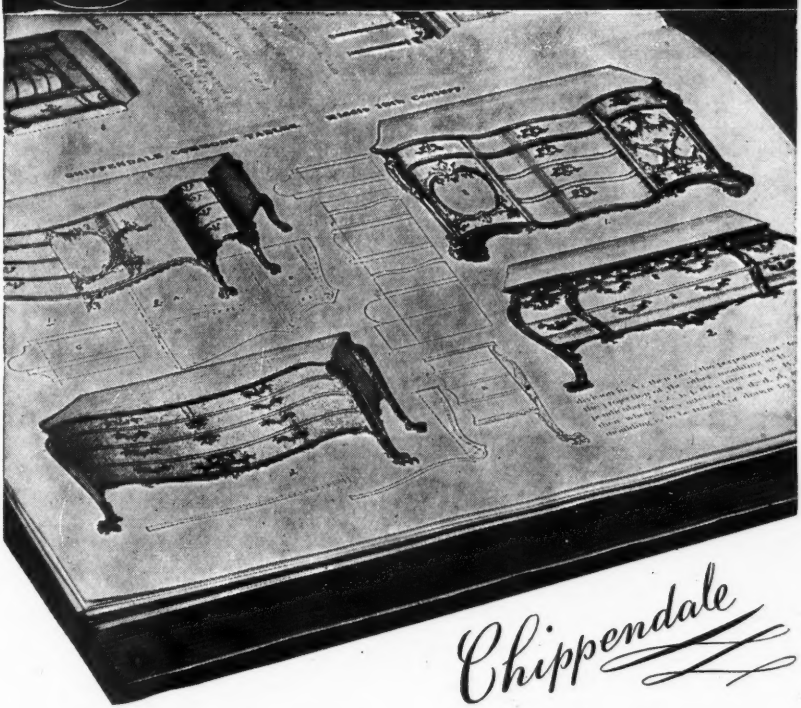
Compo H Bearings are die pressed from true alloy bronze powders. The oil is impregnated into the bearing and the porous structure takes up to 30 per cent. by volume of lubricant. An oil film is maintained by capillary attraction and metal to metal contact is prevented.

COMPO H

OIL-RETAINING BEARINGS

BRITISH BOUND BROOK BEARING CO. (PROPRIETORS - HARDY SPICER & CO. LTD.)
BIRCH ROAD, WITTON, BIRMINGHAM. A BIAFIELD COMPANY

MEMORIES OF THE GREAT CRAFTSMEN



CHIPPENDALE was not merely a maker of beautiful furniture. He was the creator of an entirely new style and standard of craftsmanship. Beauty of form allied to comfort and usefulness found new expression in his work.

In every age there is need for new expressions of craftsmanship suitable to the requirements and conditions for the period. In Chippendale's day, fine furniture and comfortable homes were luxuries, and he and his craftsmen were able to supply the limited market with the labour of their hands. Today, the proper equipment of millions of comfortable homes with such amenities as electric light and heat requires large-scale production. But craftsmanship still lives. Aided by scientific mechanisation, the M.E.M. engineers can express their skill in turning out electrical switches, fuses and motor starters by the thousand every day. Yet each single product of this great factory is a marvel of accuracy, durability and fitness for the purpose for which it is designed. This is the New Craftsmanship, perfected in the self-contained M.E.M. factory.

MIDLAND ELECTRIC MANUFACTURING CO., LTD., TYSELEY, BIRMINGHAM, 11

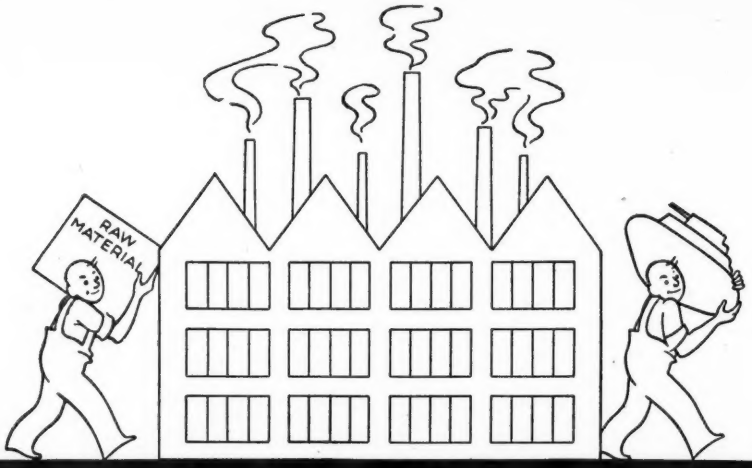
London Showrooms and Stores :
21–22, Rathbone Place, London, W.1.

Specialists in Switch, Fuse and Motor Control Gear.

M·E·M

Manchester Showrooms and Stores :
48-50, Chapel Street, Salford, 3.

Manufacturers of High Efficiency Electric Fires.



BTH LIGHT-CONDITIONING
REDUCES MAN-HOURS WASTED ON REJECTS

"Rejects" and consequent wasted man-hours and material may be reduced to the absolute minimum if the lighting conditions in the factory make seeing easy and accurate BTH Light-Conditioning gives to each worker exactly the right light for the task in hand and thus helps to ensure maximum, sustained production free of all avoidable defects.

Let B T H Lighting Engineers help you to plan efficient lighting for production and welfare

MAZDA Lamps
with MAZDALUX Equipment

M3962 *B T H for all Electrical Plant and Equipment*

THE BRITISH THOMSON-HOUSTON CO., LTD., CROWN HOUSE, ALDWYCH, LONDON, W.C.2

ELECTRICAL REVIEW

Volume CXXXI — No. 3386

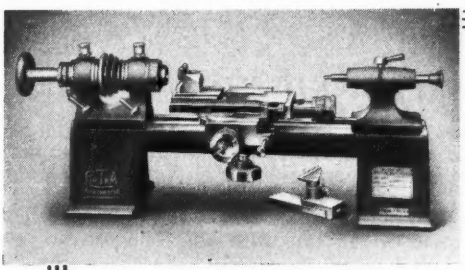
Friday, October 16, 1942

Contents

	Page		Page
Editorial—Factory Lighting	479	An Effective Safety Device	493
Deep Shelters	481	Correspondence	494
Institution Proceedings	484	Personal	495
The Step-up Tariff. By R. B. Rowson, A.M.I.E.E.	486	Recent Introductions	497
New Books	488	Commerce and Industry	499
Electrical Laboratories. By G. H. Rawcliffe, M.A., A.M.I.E.E.	489	Electricity Supply	502
Conditions in Factories	491	Wartime Boiling Plates	503
Industrial Accidents	492	Financial Section	504
		New Patents	509
		Contract Information	510
Classified Advertisements	61	Index to Advertisers	72

EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1.

Telegraphic Address: "Ageekay, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (35 lines).
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.
Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £1 14s. 8d. per annum.
Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank."



NEW MODEL **CU-45**

CENTRE HEIGHT 50 m/m
SPINDLE BORE 10 m/m

Speed range 400 r.p.m. to 6,000 r.p.m. for motorised model

MANY ACCESSORIES

PULTRA MANCHESTER

MICRO-LATHES

Entirely new constructions with outstanding improvements representing the modern conception of

SMALL PRECISION BENCH LATHES

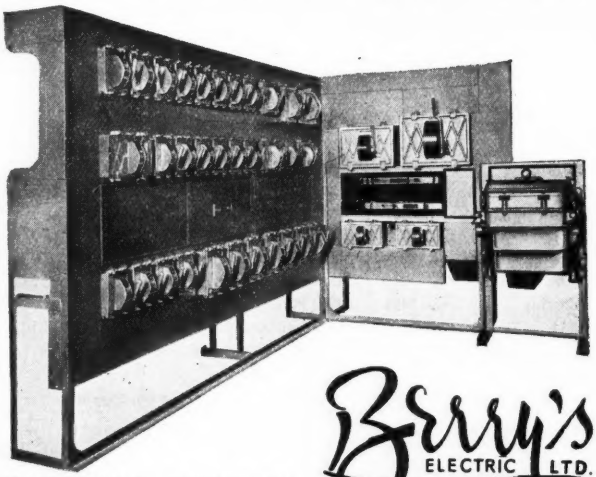
of 50 m/m Centre Height for

WATCH, CLOCK AND INSTRUMENT WORK

Upon request, Test Chart with each Lathe

PULTRA LTD., 24 GRAVEL LANE, SALFORD, MANCHESTER
Telephone: BLA. 9181

SWITCHBOARDS



FOR LIGHTING AND POWER DISTRIBUTION IN FACTORIES AND INDUSTRIAL ESTABLISHMENTS

Berry's ELECTRIC LTD.

85/86 NEWMAN ST., LONDON, W.1
ALSO BIRMINGHAM, MANCHESTER AND NEWCASTLE

NOV. 11
Please Give Generously
REMEMBRANCE DAY

A NATIONAL NEED!

INVESTIGATIONS over many years by our regional engineers have convinced us that a large proportion of steam-raising plant in this country operates at low efficiency, the outcome of the ease with which high-grade fuel could be procured. Tests show that CO_2 readings of 5% (or even lower) in the stack are more the rule than the exception. In hundreds of recent cases, this percentage has been raised to 10% or more with consequent saving of fuel.

Cambridge equipment for fuel economy is easily installed, easily maintained and fool-proof in action. Preliminary details are given in Cambridge Publication No. 251-X.

Issued by
CAMBRIDGE INSTRUMENT CO. LTD., 13 Grosvenor Place, London, S.W.1

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXI. No. 3386. OCTOBER 16, 1942 6d. WEEKLY

Factory Lighting

Operation of the Regulations

ALTHOUGH the Chief Inspector of Factories has much to say regarding accidents and about lighting, the close association of the two subjects is not very strongly emphasised in his report for 1941. Yet, as has been made very clear in the past, the influence of lighting upon the accident rate is considerable.

The report lays most stress upon the productive aspect of lighting and this is certainly justified. Surveys made before the war by the Illuminating Engineering Society and the Electric Lamp Manufacturers' Association revealed how lighting improvements led to substantial increases in production, particularly where fine work was concerned. It was, of course, this factor, coupled with the comfort and safety of workers, which led to the introduction of the Factories (Standards of Lighting) Regulations early last year. By the contrary workings of fate the need for improved standards became most evident just when the necessary labour and materials required for their realisation were becoming scarcer.

N.I.E.L.S. Commended

Consequently, though much has been done to raise illumination levels in factories of all kinds, there remains much more to do even to reach the modified requirements embodied in the Regulations. As might have been expected, it is the medium-sized and smaller factories which have lagged behind in this matter. In this connection Sir Wilfrid Garrett commends the work of the National Industrial Electric Lighting Service (a co-operative arrangement between all branches of the electrical industry) which gives free advice to industrialists upon lighting questions of all kinds.

One effect of the Regulations has been to cause dissatisfaction with conditions which have been borne uncomplainingly for years. It has been suddenly realised that many unexplained troubles have been due to poor illumination and that a continuance of the conditions is literally " sinning against the light."

Improving Existing Arrangements

Material shortage need not always be a deterrent to better lighting. There is an enormous waste in installations which have been made piecemeal as and when required. Often by simple rearrangement of existing fittings and wiring a great improvement can be achieved. Easier still is the betterment made when defective illumination is due to neglect—failure to renew old lamps, to clean reflectors and brighten up walls and ceilings.

Better lighting does not always mean more energy consumption, a major consideration with to-day's need for fuel economy. Sir Wilfrid Garrett makes a special reference to fluorescent lighting in this connection. He mentions its frequent use nowadays in inspection and assembly work and its particular attributes of low surface brightness, coolness and near-daylight and shadowless effects. True, he refers to the heavy initial cost and the greater use of materials in restricted supply,

but these have to be weighed against the undoubted advantages of the fluorescent lamp when speed in production is of the first importance. Replying to a question on the subject of fluorescent lighting in the House of Commons last week, Mr. Ralph Assheton said that the system had been introduced with beneficial results in numerous factories working for the Ministry of Supply.

Accident Prevention

EDUCATION as a means of preventing accidents is given prominence in Sir Sir Wilfrid Garrett's report. Thousands of workers now in industry lack the experience which brings caution and this must be compensated for by special means. First it is necessary to educate supervisors so that they may pass on to the workers helpful advice in avoiding accidents. Sir Wilfrid advocates the establishment of works safety committees representing management and workers ; an alternative is to add accident prevention to the functions of the production committees now being formed. Some examples of the kinds of mishaps which have to be guarded against are given elsewhere in this issue.

Control and Advertising

ONCE upon a time good wine needed no bush, but that must have been in the days of less severe competition. Now unless a concern keeps its name constantly before the public its business may fade away. This is particularly the case when war needs hinder the normal flow of products from manufacturer to consumer and sometimes stop it altogether, as is likely to happen when a factory becomes a " controlled establishment." Yet there is an impression abroad that control means the enforced cessation of advertising. We cannot find how this arose and the Board of Trade tells us that it has no knowledge of any restrictions upon advertising by controlled establishments.

Climate and Heating

THE second session of the I.E.E. Installations Section commenced last evening with the inaugural address by Mr. R. Grierson, the chairman. In this Mr. Grierson concerned himself with the British climate and the space heating engineer, analysing the records of the Meteorological Office from 1881 to the present time, in order to explain their influence upon the cost of warming buildings. Installations of this kind are considered as " machines " ; an expression for determining their thermal efficiency is formulated and the theory is applied to records compiled during the last five years from fifteen electrical thermal storage heating installations. Two years ago when dealing with facts and fallacies relating to the same subject the author remarked upon the apparent elusiveness of the art of space heating, but showed that when treated as " heat energy" it seemed automatically to conform to the same laws as other forms of energy.

I.E.E. Qualifications

IT has sometimes been maintained that it is not necessary for radio workers to possess the knowledge of electrical engineering which is the test for membership of the I.E.E. and superficially this may seem sound. But Dr. Smith-Rose shows that it is not. In his address to the Wireless Section last week he pointed out that designers and constructors of radio equipment often have to deal with electrical plant operating at high and dangerous voltages and they should therefore be fully acquainted with it. He agrees, however, that there should be a change in educational methods: that universities should arrange courses in communications engineering, on the same plane as physics and electrical engineering courses, which would include the physical and engineering fundamentals of the subject.

Technical Literature

FEW applications of scientific principles can have progressed as rapidly as has electrical engineering during the past forty years. This period has seen not only enormous strides in technical development, but even changes in the conceptions of fundamental principles. Early designers, lacking really helpful books, accomplished what they did largely by means of " judicious guesswork," as Mr. L. H. A. Carr termed it in his chairman's address to the I.E.E. North-Western Centre—an address that gave a clear idea of what is required of technical literature. His tribute to the high standard maintained in the British electrical Press was an appreciated recognition of the work of those who have the onerous, though pleasurable, duty of keeping abreast of and commenting on electrical developments.

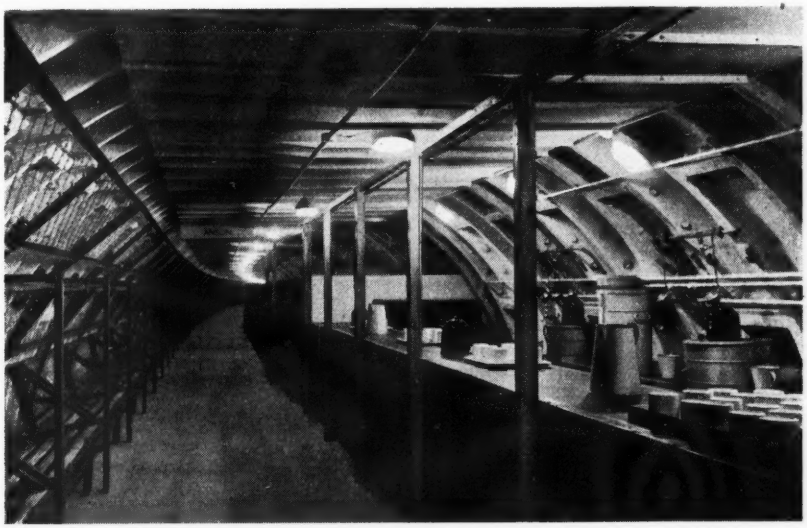
Deep Shelters

Arrangements for Duplicate Electricity Supplies

THE new deep shelters which the Ministry of Home Security is just completing underneath sections of the Underground railway system are of especial electrical interest on account of the provision made for furnishing duplicate supplies of power. These new shelters, eight of which are being constructed, are situated about 40 ft. immediately beneath the railway, or about 100 ft. below ground level, and consist of twin reinforced concrete-lined tunnels, 1,200 ft. long and 16 ft. 6 in. in diameter, each divided horizontally by means of a concrete slab to form upper and lower floors.

Access is obtained either through the tube station under which the shelter is centrally situated, or by means of two " pill-boxes " and shafts approximately 600 ft. apart provided with spiral staircases and 9-cwt. 100 ft. a minute Marryat & Scott service lifts (operated by a 5 HP, 630 V DC, 930 RPM motor) which can, if necessary, be used for carrying casualties. Every shelter has sleeping bunks for 8,000, so that altogether 64,000 persons could be accommodated, which is rather more than one-third of the number sheltering in the tubes during the 1940–41 raids. The arrangement has been particularly well thought out and makes the utmost use of the space without congestion.

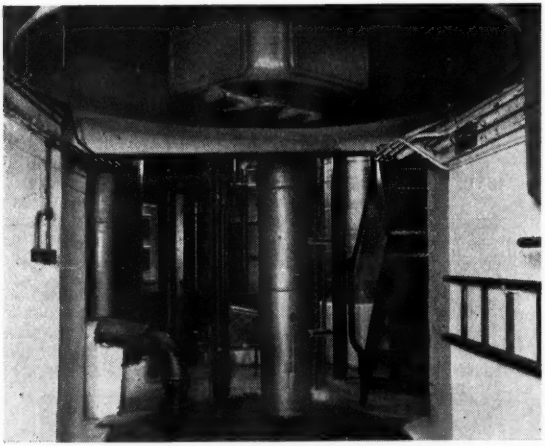
In order to give a clear idea of the supply arrangements, it will be best first to refer to the various electrically operated apparatus installed. In the first place, there are in each shelter 850 lighting points, all on a 230-V supply. In the main tunnels the fittings are arranged at 12-ft. centres and although now, in view of the fuel economy drive, housing only 40-W instead of 60-W lamps, provide a well-diffused illumination of fairly high intensity. Every fourth lamp is on an emergency lighting system, which, dimmed and with the normal lighting switched off, provides " sleeping " lighting at night. For this dimming a 2-kVA 230/115-150-V tapped single-phase auto-transformer (London Transformer Products) is controlled by a weatherproof Santon change-over switch. Except in the case of the medical aid posts where Holophane totally enclosed pendant units have been installed, all the lighting fittings are of the Heyes & Co. " Lacent " bulkhead type. Incidentally, the medical aid posts are equipped with 15-A points for hotplates for



A section of the tunnel showing one of the all-electric buffets

boiling water, etc., sterilisers and local heating, and 5-A points for inspection lamps.

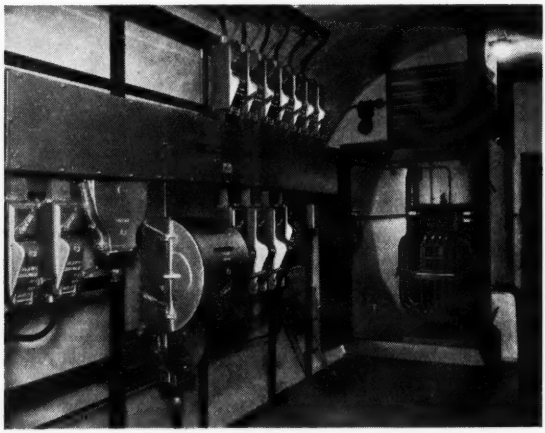
To supply the shelterers with light meals and hot drinks there are four buffets, each



One of the ventilating fans, with the air compressor and receiver for the sewage ejection plant in the background

provided with a Coldair pie warmer (2 kW), a 2-kW hotplate and two 10-gal. G.E.C. water heaters (3-kW) of the washboiler type. Much of the last-mentioned apparatus has already proved its worth in the buffets in service in the tube shelters.

Ventilation of such a large enclosed area obviously presents considerable difficulties. The problem has been overcome by the installation of two 5-ft. diameter fans (Aerex and Howden), in protective



AC switchboard and step-up transformer in one of the control rooms

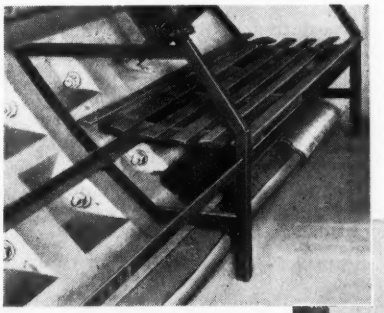
housing, driven by 25 or 28 HP, 630-V DC motors, running at between 475 and 735 RPM, at the bottom of the shafts at each end of the tunnel. These provide an air flow of 80,000 cu. ft. a minute and normally are arranged to extract the air, causing an induced draught through the shaft, the tunnels themselves acting as vent ducts. Provision is made to reverse the fans in the event of a gas attack, when the doors which provide the normal air intake would be closed and the air admitted through filters in the tops of the pill boxes.

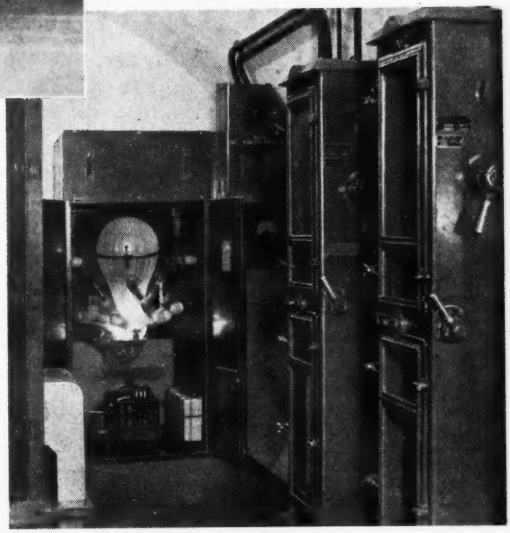
The air ducts also accommodate the wiring for the telephone system which, centred at the wardens' post, includes, besides a G.P.O. instrument and a connection with the London Passenger Transport Board's automatic system, a seven-point house phone for communication with various strategic positions in the shelters.

Fully automatic control, effected by means of a Watford Electric panel, has been installed for a sewage ejector plant (Adams Hydraulic and Hughes & Lancaster), which, by means of an air compressor (18 HP, 630-V 1,500-RPM DC Lancashire Dynamo motor) and air receiver (100 lb. per sq. in. pressure), forces to ground level sewage collected in a sump 15 ft. below the bottom of the tunnel. For cleaning out the shelters a Sturtevant industrial type vacuum cleaner fitted with a 230-V, 4,250-RPM universal motor can be connected to switch plugs placed at 200-ft. intervals along the length of the shelters.

The alternative sources of power are quite independent, one coming from the local electricity supply undertaking and the other from the London Passenger Transport Board. In normal circumstances the former will be employed for all purposes except the emer-

gency lighting system. The supply from the electricity undertaking is brought to each of





Above: Cables carrying the Board's supply are run under the bunks. A section is shown with the protective covering removed. Right: Mercury-arc rectifier and DC switchgear serving ventilating fans, lift motor and sanitation plant

the pill boxes where two 75-kVA Scott-connected Hackbridge transformers step down from 2,000 V, 50 cycles, 2-phase, to 400 V, 50 cycles, 3-phase. After metering, the supply is carried by means of a four-core paper-insulated lead-covered cable (three cores 0·25 sq. in. and neutral 0·12 sq. in.) down the lift shaft to the control room situated 15 ft. beneath the bottom of the shaft and serving half the shelter. Each of these control rooms is designed for a load of 145 kW, plus about 12 kW for emergency lighting.

To provide the alternative supply a new 11-kV feeder, laid from the Board's substation, is tapped off through switchgear to a 11-kV/400-V, 33⅓-cycle, 3-phase Hackbridge transformer situated on the station platform. From here the 400-V supply is taken by four-core p.i.l.c. cables (three cores 0·25 sq. in. and neutral 0·12 sq. in.) under the staircase leading from the station to the shelter and thence *via* ducts on brackets underneath the sleeping bunks to the control room. Under the bunks the cables are protected by means of metal covers and are thus screened from possible damage throughout the whole of their length.

Arriving at the control room the two separate supplies are taken to the AC busbars which are split, so that by means of a change-over switch it is possible immediately to go over from the normal supply from the supply undertaking to the alternative supply from the Board. From the Board's side of the split busbars tappings are taken to two switches for the emergency lighting, which is thus always supplied by the Board.

From the busbars leads are taken to 60-A, 500-V switch-fuses for the vacuum cleaning plant and for the lighting throughout the shelter; to 100-A, 500-V switch-fuses beneath for local heating and buffets; to a 30-A switch-fuse for the lift control and lighting; and to a 15-A unit for the automatic CO_2 fire extinguisher alarm (Walter Kidde) for the transformer chamber mentioned below.

From the end of the busbar chamber a 400-V, 3-phase supply is carried through a 150-A Statter oil circuit-breaker to a 70-kVA, 400/600-V Hackbridge oil-filled transformer with an input of 118·5 A and an output of 32 A. This transformer and circuit-breaker are housed in a separately constructed room built inside the control room and, since the oil-filled transformer is housed underground, special automatic CO_2 fire extinguishing apparatus has been installed. In addition an oil pit filled with selected rock ballast has been constructed under the transformer. On the operation of the fusible link of the CO_2 equipment the cubicle is automatically sealed by means of a shutter which drops down and both visible and audible warnings (" Tangent ") come into play.

Connected to the 600-V side of the transformer is a Hewittic mercury arc rectifier (630-V, 111-A rating) which is equipped with a universal fan for cooling. The output goes *via* a Statter circuit-breaker to the DC switchboard, where 60-A switch-fuses feed the lift motor, sanitation plant and the ventilating

fans. These switch-fuses have fuses of the Siemens " Zed " traction type. In all other cases, except the 100-A fuses for the buffets and local heating switchfuses which are of the English Electric " T " pattern, the open wire type are utilised. Brookhirst starters control the fans. Both AC and DC switchboards were supplied by Siemens Electric Lamps & Supplies, Ltd.

To keep the electrical equipment in good condition, tubular heaters loaded at 2½ kW are installed in each control room. An earthing strip is run round the entire control room and is bonded to the cast-iron lining of the tunnel by means of a ¾ in. drilled and tapped connection, a resistance of 0·2 ohm being achieved. All the electrical services are in welded conduits with electric thread. Fuseboards at each of the head walls control the lighting in half the length of the tunnel. Separate emergency lighting fuseboards are provided in both shelter tunnels. Maintenance of electrical equipment is being undertaken by the L.P.T.B. organisation.

INSTITUTION PROCEEDINGS

Wireless Section Address. *Melchett Lecture.*

DR. R. L. Smith-Rose's address as chairman of the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS is in three parts. The first deals with the past, present and future of the Section. While it was not until 1919 that it was formed, a few papers on radio engineering had come before the Institution from time to time, even before 1900. Dr. Smith-Rose mentions several papers which marked forward movements in the radio world by such men as Lodge, Preece, Marconi, Duddell, J. E. Taylor, Sir Ambrose Fleming and Eccles.

Radio Education and Research

It was the late C. H. Wordingham who as president in 1917-18, suggested sectional meetings of the Institution and a beginning was shortly afterwards made with the subject of wireless telegraphy, the first inaugural address being given in November, 1920, by Dr. W. H. Eccles, who reviewed the work of the first year. It is perhaps indicative of the youth and virility of the Section to record that with the exception of Mr. E. H. Shaughnessy, who died last July, all the past-chairmen are still with us, most of them actively engaged in the wireless profession. Dr. Smith-Rose, after a review of the proceedings of the Section, considers it desirable that renewed attention should be given to the formation of local Wireless Sections.

At the present time it may be thought that the whole of the members' efforts should be put into their share of the work directed to the prosecution of the war, but there is a good case for the continuance of the Section's meetings. First, they provide some relaxation, or even recreation ; secondly, it is a good thing for those engaged in development and research work to sit back occasionally in order to study the progress of the situation as a whole.

Much of the useful material which would form the subject-matter of papers is now under the Censor's ban, but it is important to ensure that such restriction is not unnecessarily imposed to the detriment of the profession and the national effort. It is essential to continue the meetings and members should co-operate to the best of their ability to provide material for papers and discussions.

Referring to qualifications for membership of the Institution, Dr. Smith-Rose considers that, while radio workers should have an adequate fundamental knowledge of electrical engineering, there should be more appropriate arrangements in the science and engineering faculties of our universities for dealing with the subject of communications engineering.

The growing tendency to specialisation in radio technique must not lead too rapidly to sub-division of the Section. Members, particularly the younger ones, should be encouraged to present papers reviewing progress in particular spheres. When the hand of the Censor is removed there will be a flood of literature. Dr. Smith-Rose therefore appeals to members to keep papers as brief as possible without sacrificing clarity. In this matter the necessity for keeping the B.S.I. glossaries up to date is mentioned.

Research Board's Activities

Part II of the address is devoted to the work of the Radio Research Board and Dr. Smith-Rose states that of the 246 papers presented to the Section during the past sixteen years, eighty have come from the staff working under the Board's auspices. He quotes from the survey made by Sir Robert Watson-Watt, as chairman of the Section, in 1935, to show the importance and continuing nature of the Board's work. Apart from its research and investigation activities, the Board is responsible for a comprehensive and unique series of abstracts and references published monthly in the *Wireless Engineer*.

Long-term investigations made for many years past are now proving of great value in the war, even most of the apparently more

academic subjects. All this work was carried out at a trifling cost compared with the magnitude of present-day expenditure on radio research and development.

Speed of Wireless Waves

The speed of travel of wireless waves forms the subject of the third part of the address. In this connection Dr. Smith-Rose points out the difference between velocity and speed. The former, he says, involves the direction of travel as well as the speed or rate of motion in that direction. It is possible that the lack of distinction between the terms is due to the long-established fact that, except in a non-homogeneous medium, light follows an accurately rectilinear path, so that its direction of propagation is usually quite obvious.

James Clerk Maxwell's Royal Society paper in 1864, showing that any change in an electromagnetic field produces a disturbance which travels through space at a speed depending on the ratio of the electromagnetic and the electrostatic units of charge, and the dielectric constant and magnetic permeability of the medium occupying the space, is considered to have laid the theoretical foundations of radio communication.

Dr. Smith-Rose demonstrates the need for knowledge of speed of propagation, dealing with the measurement of wavelength and frequency, the study of wave propagation and the utilisation of time signals and the measurement of longitude. A good deal of attention is given to the determination of the velocity of light and then Dr. Smith-Rose relates this to the study of the speed of wireless waves.

Earlier investigators obtained values appreciably less than the known velocity of light, but more recent calculations, employing more accurate methods, have shown much closer agreement between the two. Details of methods adopted and results obtained by a number of investigators are given, and the conclusion is reached that the problem of the measurement or calculation of the actual time of transit of radio waves between sender and receiver is still open to investigation.

Unity in Diversity

IN the INSTITUTE OF FUEL membership are men in what are almost competitive industries and it is therefore necessary for the Council to go behind the outward face of these industries and to achieve "unity in diversity." This view is expressed by Mr. W. M. Selvey in his address as president of the Institute delivered last Tuesday.

Mr. Selvey deprecates the idea of "unity in uniformity" of which spirit there is far too much even in the most liberal forms of government. Moreover, the *laissez faire* attitude, or "unity in indifference" is a bankrupt policy.

Diversity in its ultimate nature is good. Those coming together in this way must be humbly conscious that their personal contributions can be only a few wavelengths in the continuous spectrum of truth and by over-emphasis a line spectrum will be produced. "Their object must be as far as possible to produce a pure white light by a harmonious combunation of all wavelengths."

Referring to the constitution of the Council Mr. Selvey scouts the idea of frequent and drastic changes in view of the value of continuity.

In conclusion he extends a welcome to the Ministry of Fuel and Power and stresses the necessity of "divorcing purely technical and economic problems from 'emotion.'"

The Melchett Lecture

THE novel medium of a talking film was used for the delivery of the 1942 Melchett Lecture to the INSTITUTE OF FUEL by Dr. Arno C. Fieldner, Chief of the Fuels and Explosives Service, Bureau of Mines, Washington, D.C. The lecture, entitled "The Analysis and Testing of Coal in Relation to its Properties and Utilisation," covered thirty-five years of coal testing and research in the Bureau.

Having reviewed the early history of coal testing which, with the establishment of the testing plant of the U.S. Geological Survey at the Louisiana Purchase Exposition in 1904, had begun to be organised on a national scale, Dr. Fieldner referred to the work of the American Society for Testing Materials Committee on Coal and Coke, of which he became chairman. The first new test to come to the attention of the Committee concerned the fusibility of coal ash as a measure of the probable clinkering properties of ash in boiler furnaces. He then dealt with gas, coke and by-product making properties of coals and finally with the petrographic analysis of coal.

Mr. Mumford Colebrook, of the United States Embassy in London, accepted the Melchett Medal on behalf of Dr. Fieldner and it is hoped that the medal will be formally presented to him at a meeting of the American Society of Mechanical Engineers.

North-Eastern Students' Section

THE North-Eastern Students' Section's opening meeting on October 9th was devoted to an address by the chairman, Mr. A. E. Shearer, on "Publicity in Electrical Engineering." A works visit has been arranged for to-morrow (Saturday), and the next meeting is on October 23rd. On November 6th the Section is holding its annual dance, and subsequent events this year are:—November 20th: Paper on "Fires in Electric Power Stations," by Mr. M. A. Tucker. December 4th: Address by the Centre chairman, Mr. H. W. Green. December 18th: Paper on "Automatic Telephone Switching," by Mr. L. Mew.

The Step-Up Tariff

Standardising for Economy

By R. B. Rowson,
A.M.I.E.E.

CERTAIN developments arising from the war-time fuel and plant shortage give the electricity supply industry a great opportunity to offer its consumers a standard form of tariff. The present fuel economy campaign and the possibility of rationing resulting from these shortages have elicited questions in Parliament and the Press regarding minimum charges and the position of two-part tariff consumers who have reduced their consumption. Much, if not all, of the dissatisfaction regarding the industry rises from the present complexity of the tariff structure and the lack of any real publicity to explain why it is justified. To start such publicity now may be inopportune and there is more than a possibility that if the industry fails to standardise now on a voluntary basis, such standardisation will be brought about by legislation shortly after the war.

The author suggests that present conditions provide a favourable opportunity for introducing a standard electricity tariff. He propounds a step-up rate comprising a primary high charge, secondary low charges for summer and winter, and an increased charge for consumption above stated limits in the winter quarters

Following agitation regarding the minimum charge, the Minister of Fuel and Power has made an Order suspending (or, strictly, limiting) it, even though the case for its retention is almost unassailable. The critics, having gained this point, have now concentrated on the position of the two-part tariff consumer who has patriotically reduced his consumption, and it has been proposed that he should be at liberty to change to a flat-rate tariff. In many cases this would involve the installation of additional meters and alteration of the consumer's wiring, tending to make the scheme impracticable due to the present shortage of labour and materials. Another suggestion has been to reduce the fixed charge. Where this is based on installed wattage, as is usual for shops and offices, the adjustment is usually made, but what is one to do with the domestic consumer who uses one bar only of his 2-kW fire, or replaces many of his lamps with smaller ones? If the fixed charge were on some rational basis some reduction would be possible, but it usually is not so.

Quite apart from the need to save fuel, the mounting load of war industry has rendered the generating capacity position very critical. Under these conditions a snap peak due to heating would be extremely embarrassing, both to the Central Electricity Board and to the undertakings who would have to pay the additional kilowatt charges so incurred.

Since new metering apparatus cannot be provided due to shortage of materials and labour, possibly the method of charge made use of by the Tennessee Valley Authority and more recently by one of the New Zealand Boards could be combined with a block tariff to give a tariff which would command universal acceptance and could be offered by all undertakings to all consumers.

The general principle of the step-up rate is that after a prescribed consumption at a low price per kWh the price is increased. In the T.V.A. residential rate, for example, the price drops on a sliding scale from 1.5d. per kWh to 0.2d., but when the consumption exceeds 1,400 kWh per month it increases to 0.375d. per kWh.

In the New Zealand tariff the step-up is more drastic. The consumer pays a fixed charge of 6d. per 100 W of water-heater loading per month and 0.5d. per kWh for a consumption up to about 80 kWh per 100 W per month. The price is then increased to 2d. for commercial uses and 1d. for domestic purposes.

A great advantage of this sort of tariff is that a consumer is encouraged to make the best possible use of his installation so as to avoid reaching the higher price region. The tariff discourages waste for the same reason. If price demand curves are to be relied upon, the effect of the step-up will be greater than the ratio between the kWh prices would suggest, as the consumption will have reached the point where the marginal price is low.

On the supply side, experimental evidence and common sense both suggest that the more the use the less the diversity. The step-up rate has regard for this by imposing a much higher price when the apparatus is used more than a certain number of hours.

Application to Present Conditions

As a result of agitation regarding the two-part tariff consumer, many undertakings are making concessions, and the already bewildering number of tariffs is likely to be increased and standardisation made more difficult. At the same time any suggestion, to be acceptable to the public, must enable the consumer to obtain a cash value for any economy he is able to make in the use of electricity. It is for this reason and to avoid the feeling of paying something for nothing that the tariff put forward is in the form of a

block rate rather than in the form of a fixed charge with one or more running charges.

Another point in favour of the block rate is that, if it is suitably devised, all consumers, even flat-rate consumers, can be charged under it. The prepayment consumer is more difficult to deal with, but there are at least three alternatives—the rebate, the equated rate with adjustment on collection, or, as a post-war development, a meter which changes the rate after so many coins are inserted.

The method of fixing the size of the blocks is open to considerable differences of opinion. Some argue that the demand of a house bears a relation to the rateable value, others that the fixed charge or first block should cover normal lighting, and that the running charge covers the whole cost, both kW and kWh, of supplying the cooker, fires and other apparatus. From the point of view of lighting and possibly the almost universal radio and iron, there is nothing to choose between the different bases. Information has, however, been collected by the fuel overseers and the number of rooms in all houses on a uniform definition is known. Many undertakings already assess on this basis and though it is imperfect, in that size is neglected, the availability of the information suggests that it should be adopted as the standard.

To be fair as between one consumer and another, the number of kWh in the blocks should vary, depending on the installed loading. With existing tariffs there is as a rule no incentive for the consumer to declare his loading and in fact to do so usually means that his charges are increased. One very considerable virtue of the step-up rate is that the consumer reaps an advantage if his loading is declared ; on the other hand, failure to declare does not prevent the rendering of accounts.

Proposed Standard Tariff

One rate throughout the country is perhaps an impossible ideal and in view of this two scales are suggested. These scales, which are put forward as a basis for discussion, assume that a coal increase equivalent to about ¼d. per kWh above 1938 prices is in operation, and this should be borne in mind when comparing the scales with pre-war rates.

Price per kWh (including meter rental)

	Rural	*Urban*
First step	6d.	4d.
Second step ..	0.75d.	0.65d.
Third step	1d.	0.85d.
Fourth step ..	3d.	2d.

The number of kWh chargeable per quarter at each step will be as follows:—

First step: 32* plus 6 per room, 25 for each cooker, 10 per kW of water heating and 35 per kW of fires and other heaters.

Second step: All kWh supplied during the summer quarters in excess of the first step.

Third step: All kWh supplied in the winter quarters in excess of the first step up to a maximum of 300 for each cooker and for each kW of fires and heaters, plus 250 for each kW of lagged thermostatically controlled water heating, 75 for each kW of manually controlled water heating, including kettles, and 30 for each iron and for each radio set. The apparatus mentioned is that installed and declared.

Fourth step: All kWh in excess of those chargeable under the first and third steps.

It is not claimed that this tariff will give exactly the same charge to each consumer as every tariff now in force, but provided fires are not used during the winter, the revenue is similar, for urban areas, to a two-part tariff with a ¾d. kWh charge (or a ¼d. running charge plus an overall wartime increase of 20 per cent.). Existing two-part tariff consumers would have to be allowed the option of remaining under their present tariffs, but all new consumers and existing flat-rate consumers would be charged under the standard tariff. The tariff would, of course, have to receive suitable national publicity. Undertakings having exceptionally low costs and wishing to pass these on to their consumers could do so by cash discounts for prompt payment.

Discouraging Snap Peaks

Electric fires are encouraged during the quarters when their use is not disadvantageous nationally and the regular fire user pays a charge which is a reasonable reflection of the cost of supplying him. Haphazard use of fires—and the consequent snap peak—is discouraged, as consumers who did this would soon exceed their quota of low-priced winter kWh.

The consumer who reduces the loading of his fires or water heaters obtains an immediate cash benefit; at the cost of complication, consumers reducing their average lighting watts per room below 60 could have their assessment of 6d. (or 4d.) kWh reduced. Careless users who exceed their quota of low-priced winter kWh and come into the 3d. or 2d. rates will have a great inducement to economise ; this will perhaps do more to encourage fuel saving than any other factor.

Application to Shops

For shops, the number of kWh chargeable each quarter could be 32+5 per 100 W of lighting installed, and during the winter the 5 kWh per 100 watts could also be the number supplied at the low rate. For small motor loads 25 kWh per HP installed and declared could be charged each quarter at the high

* From some points of view it is better to make this a varying figure, *e.g.*, 14 per summer quarter and 50 per winter quarter.

rate, while the allowance at 1d. (or 0.85d.) could be 150 kWh per HP.

If a tariff on these lines could be agreed with only two sets of kWh rates throughout the country a great step forward would have been made. A simple standard application card overprinted with each undertaking's name could be used and a consumer moving from one town to another would know exactly how much he was to be charged—as he does now for a considerable number of other goods and services. Copies of the standard terms and conditions applicable throughout the country would be available.

Notes on the Tariff

Twenty-eight of the 32 fixed kWh per quarter partly cover fixed charges, such as meter readings and accounts, interest and repairs on the service and meter. To avoid making this figure too large, the tariff has been based on a three-roomed house. Those with more rooms help to pay for those with less.

The kWh rates are approximately those for what is probably the cheapest load to supply, automatically controlled water heating. The additional kWh at 6d. (or 4d.) make up the difference in costs between supply at these rates and the average price per kWh for the apparatus named. The radio set being almost universal is not assessed separately, but is included in the fixed 32. Some of the lighting is also carried here in order to have regard for the higher wattage in the living rooms.

NEW BOOKS

Automobile Electrical Equipment. By A. P. Young and L. Griffiths. Second edition. Pp. 351 ; figs 329. Iliffe & Sons, Ltd. Price 15s.

Owing to the fundamental nature of the book no major revisions have been necessary in this new edition which has been brought out to meet a growing demand for a work that has been out of print for some time. Certain minor amplifications and amendments have, however, been made to bring the subject up to date. The sections of the book on aircraft magneto ignition should prove of particular interest to the ever-growing number of persons engaged in the aircraft industry.

Factory Layout, Planning and Progress. By W. J. Hiscox. (Revised by J. Stirling). Third Edition. Pp. viii + 195. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 7s. 6d.

Under war conditions industry finds itself relieved almost entirely of the selling problems that play so large a part in colouring manufacturing policy in normal times. This relief is, however, more than offset by the increased necessity for utmost efficiency in the operation of each factory as a production unit. The engineering industry in particular is faced with what virtually amounts to an insatiable demand for its products. And where, in peacetime, a broken delivery promise meant an unpleasant half-hour with an irate customer, to-day a broken delivery schedule in one individual factory might in the end be the cause of national calamity.

Undoubtedly the majority of firms are fully alive to their responsibilities in this direction, and it would be idle to deny the increased difficulties that wartime conditions have set in the path to peak efficiency. It would seem, however, that there is a tendency for the individual executive to get so swamped by these new demands upon him that he tends to lose sight of the wood for the trees.

Almost every individual business has had to make considerable changes in its technique and methods to cope with the new demands brought about by the war. In many cases these changes have had to be made at short notice and without the usual forethought. In these circumstances it should be a considerable help to get away from the consideration of the detailed day-by-day worries to a more general review of basic principles and practice. This book provides such an opportunity.

The book is not a new one. It is in fact a reprint of the previous edition, but it does provide a really readable exposition of the art of planning and running a factory. The conception of the scheme is that the problem falls into two parts, with on the one hand planning and routeing to establish the task and the means of performing it, and on the other hand, progress work to see that the task is achieved. Throughout the text the author illustrates his point by reference to examples based on actual practice.—A. W. W.

The Costing of Government Contracts. By Lawrence W. Robson, F.C.A., F.C.W.A. (16 pp., 1s. 6d. net) and **Government Contract Cost Investigations.** By F. R. M. de Paula, O.B.E., F.C.A. (19 pp., 1s. 3d. net). Gee & Co. (Publishers), Ltd., Osborne Road, Potters Bar, Middlesex.

These are reprints from *The Accountant* of lectures, given last April, and dealing with a subject which has received much attention during the past year or two. Mr. Robson reviews very ably the various classes of contracts and methods of costing them, calling attention, *inter alia*, to many items which may not receive due consideration in the ascertainment of overhead expenditure.

Mr. de Paula's lecture deals with the negotiations between the Treasury and the Federation of British Industries which resulted in the drawing up of a code of costing which is now used in all cost investigations. This code is reprinted as an appendix.

Procedure Handbook of Arc Welding Design and Practice. Seventh edition. Pp. 1267 ; illus. Lincoln Electric Co., Welwyn Garden City. Price 10s., post free.

Welding equipment, procedure, speed and costs, methods of testing, weldability, design and applications are all dealt with in this new enlarged edition.

Electrical Laboratories

Types of Equipment Required for Technical Colleges

By G. H. Rawcliffe,
M.A., A.M.I.E.E.
(Robert Gordon's Technical College, Aberdeen)

THE present acute shortage of technicians and the steps being taken to meet it have focused attention on the equipment of college laboratories, which in many cases has been quite unable to meet the overload, especially in telecommunications subjects. The inevitable post-war reaction to this will be the re-equipment of electrical laboratories, and some steps towards this have even been compelled by immediate wartime needs.

The first requirement of a college laboratory is flexibility. In general, far less money has been spent on electrical equipment than the subject demands, but even such money as has been available has often been unprofitably spent on over-specialised equipment. Preference should be given to apparatus which will illustrate the maximum number of ideas for a given expenditure. A list of the ideas/expense ratios for various sections of electrical science and practice might be prepared, and a sound criterion of the wisdom or otherwise of purchasing a particular type of equipment would be its position in this list.

The need to avoid expending the limited amount of money available on over-specialised equipment is stressed. Thus, for example, the author considers that high-voltage technology is not well adapted for practical study in colleges

Very early in the list would come thermionic apparatus and small AC machinery, and towards the end high-voltage testing equipment and instrument standardising apparatus. High-voltage technology is not well adapted for practical study in colleges, as heavy expense is required for even relatively simple apparatus. Further, the educational value of many high-voltage tests is extremely small. One determines the impulse or power frequency flash-over of a given insulator and compares it with that of another type, but the comparison is largely empirical and there can be little correlation of theory and practice. Further, high-voltage testing is as extravagant of time as of money, a great deal of time being spent on quite uninstructive preparatory work. It might be said that never was so much money and time spent in teaching so little to so few people as in a college high-voltage laboratory.

Accuracy of Instruments

The historical origin of electrical science in physics laboratories is still shown in the attempt (usually fruitless) to maintain fantastically high standards of accuracy. Students should learn to make the best possible observations with normally accurate instruments, and should regard calibration as a luxury for special occasions. Expenditure on very high grade instruments should never be such as to prejudice the provision of an adequate number of normal industrial instruments.

A large number of portable instruments, of every type and range, for both power and thermionic work, is essential for an efficient college laboratory. It should never be necessary to hold up one group of students until another has finished with an instrument; there should be sufficient instruments to ensure that not more than three students, or better two, are compelled to work together. Besides the regular instruments in multiple there should be one of each type of good accuracy, kept apart for the purpose of checking the rest. The prime purpose of checking is to ensure that no instrument is seriously in error through misuse. Small errors through ageing can usually be neglected.

Switchboard instruments will seldom be checked, owing to the trouble involved. At best they must be treated as indicators, actual readings being taken on portable instruments. High-grade switchboard instruments represent money very badly spent.

Study of Thermionics

Thermionics is a very promising branch of electrical science for college purposes, but thermionic experimental work has been too completely dominated by " radio " in general and the broadcast receiver in particular. For example, selectivity and sensitivity tests on complete receivers are quite out of place in a college curriculum, and it is wrong to regard radio as the sole, or even the main, justification for thermionics. A more fundamental treatment of the valve as oscillator, amplifier, voltmeter, rectifier and relay will be of interest and value to large numbers of engineers outside the ranks of communication engineers.

Accordingly, the type of equipment needed is a large supply of fixed and variable inductances, condensers and resistances, AC and DC power units, audio and power transformers, valve bases, coil holders, screening cans, etc. These components

should be individually mounted with terminals so that any circuit can be rapidly connected with the minimum of " mechanical " difficulty. Numerical values should be clearly shown on the unit for rapid selection. It is not necessary, for example, to use special precision condenser boxes for most purposes ; condensers of normal commercial type can be hand picked and trimmed with smaller condensers to within 1 per cent. limits of accuracy or better. These can be mounted with switching arrangements and a complete unit made in the college workshop for a tithe of the cost of a precision condenser box.

A proportion of made-up thermionic apparatus is essential. For example, cathode-ray units, valve voltmeter, standard oscillator and universal bridge. Distinction must be drawn between experiments *using* a piece of apparatus, and experiments *about* that piece of apparatus. A complete commercial cathode-ray unit may conveniently be used to determine the amplification properties of a valve, but, to study the cathode-ray tube itself, a unit built in open style and with connections and suitable test points available, is much to be preferred.

Principles of AC Machinery

AC machinery for college use needs to be constructed with certain non-commercial modifications in order to be of the maximum educational value. For example, six slip-rings on the rotor and six leads on the stator, to make both ends of all windings available, will enable the principles of the induction regulator, the frequency changer, the synchronous induction motor and the phase shifter to be illustrated on an otherwise ordinary induction motor coupled to a DC machine. The principles of pole changing can also be illustrated on a squirrel-cage induction motor by the trivial refinement of a few extra leads from the stator winding.

An excellent plan which has sometimes been adopted is to provide one stator with a variety of interchangeable rotors, *e.g.*, synchronous, three-phase wound, squirrel-cage wound, drum armature with slip-rings and commutator, double-cage rotor and iron core unwound. This system not only saves expense but serves to impress on students the essential unity of apparently diverse types of apparatus.

Explanatory Drawings

Full drawings of the technical sections of all apparatus, thermionic and power, should be displayed in the laboratory. These should be colour-differentiated according to function, and should include design particulars and notes about the function of individual components.

Drawings and details supplied by the makers are rarely adequate in themselves, as they are addressed to the initiated without much attempt at explanation. Such drawings and details can usually be made the basis of a fully explanatory drawing prepared by a member of the college staff.

The maximum number of explanatory labels should be fixed to every piece of apparatus, so that its use would be immediately obvious to any technically trained man. Further, to prevent waste of time in making necessary but very elementary readings, such details as armature and field resistances should be marked on machines. An engraving machine in the workshop is a most helpful tool. All cables, especially removable ones, should be marked at intervals to show their function and connection. A good method of marking is to bind on small paper labels, typewritten in red, with some kind of transparent adhesive tape.

It is, perhaps, desirable to have one or two items of machinery, such as one motor-generator set, with fully automatic control and protective gear, but it is a mistake to extend this to the bulk of college equipment. It is not desirable that experiments shall be of the " press the button and the machine does the rest " type. In most cases, every circuit of each piece of apparatus (transformer, regulator, rectifier, etc.) should be brought to a terminal board and suitable connections for each test made by the students. The aim should be to present the equipment to the students in such a way that all non-essential points are either covered already or made very simple, but that all essential points have to be settled by the students themselves.

Supply Arrangements

A central relay board should enable the DC or AC mains, a heavy-capacity battery tapped at intervals, or the output of a " service " generator or regulator to be fed to any point in the laboratory. It is desirable to have AC and DC " service " generators which are, say, three times the average rating of the rest of the laboratory machines, so that the latter may be tested without unduly rapid fluctuations of their supply voltage.

These particular examples illustrate the general features desirable in college laboratory equipment :—Flexibility ; avoiding routine measurements and " local " difficulties ; needing initiative in essentials ; dealing with fundamental scientific principles ; and mainly devoted to those sections of electrical science where the density of ideas, for a given amount of apparatus, is the greatest.

The whole edifice of electrical engineering might be said to be built upon Faraday's laws of electro-magnetic induction on the one hand and the Fleming thermionic effect on the other. College laboratory work built on these twin foundations will be of abiding value to students whatever their subsequent careers.

Conditions in Factories

Chief Inspector's Report for 1941

THE immense expansion of productive industry during the past year or two adds special importance to the report of the Chief Inspector of Factories, Sir Wilfrid Garrett (Stationery Office, Cmd. 6397, price 6d.). This expansion has naturally brought into industry many thousands of inexperienced workers, very largely women, with a resultant increase in the number of accidents. It is shown that in 1941 there were 269,652 non-fatal reportable accidents, an increase of 17 per cent. on the 1940 figures, which itself was 20 per cent. greater than that for the previous year. There were 1,646 (20 per cent. more) fatal accidents. As compared with 1938 the accidents to adult males (191,343) were 42 per cent. higher; those to adult females (42,857) 192 per cent. higher; those to young male workers (27,757) 21 per cent. higher; and those to young female workers (9,347) 20 per cent. higher.

A further analysis reveals that the accident rate among adult females per thousand employed was 90 per cent. higher than in 1938. This is attributed largely to the transfer of women to dangerous processes as well as to extra time worked. Although women are liable to certain types of accident, *e.g.*, those due to the catching up of loose hair or clothing, there is no evidence that women are generally more prone to accidents. The report insists that women should be persuaded to wear caps, but that this is only a secondary precaution to the proper fencing of machines. Milling machines and power presses are the most prolific sources of accident.

Education in Accident Prevention

The education of management, foremen and operatives in the avoidance of accidents is considered most important. When it is probably an understatement to say that factory accidents cause from 20,000 to 30,000 people to be off work, with a loss of over 50 million man-hours per month, it is evident that accident prevention has serious production value.

This survey leads to a study of personnel management and welfare supervision regarding which it is said that it is not simply a matter of appointing special officers. Indeed it can often be achieved without addition to the staff although in larger factories a suitable specialised and trained staff is an advantage. This staff should be given the requisite status and authority. Moreover such a department could relieve the management of a great deal of the work imposed by war conditions in the handling and employment of workers.

Ventilation is still a subject for too many complaints although there has been steady improvement. Frequently in the blacking-out of factories the A.R.P. aspect is given more attention than the question of heating and ventilation. In the larger factories, particularly where regular night shifts are worked, it has become recognised that some system of mechanical ventilation is necessary and many plants have been installed during the year. Unfortunately, says the report, the problem is now becoming one of the supply of ventilating plant rather than the earlier one of convincing those responsible of its necessity. It is noted that the thorough removal of harmful dust and fumes becomes of even greater importance if natural ventilation is deficient.

Considerable attention is devoted to lighting. It is said that the result of a year's experience of the Factories (Standards of Lighting) Regulations, brought into force on February 1st, 1941, has been satisfactory on the whole. To comply with the Regulations, it became necessary for a large proportion of the factories to which they apply to improve their lighting. In spite of labour shortage and difficulties in obtaining equipment, a good deal of progress has been made and this progress has been stimulated by the National Industrial Electric Lighting Service.

The new wartime factories and a good proportion of the larger factories generally have already attained a good standard, sometimes well above the requirements, but, generally speaking, the medium-sized and smaller factories have lagged behind. The Regulations have done much to bring home to industry lighting needs which were not properly realised before.

Replanning Lighting Installations

Primary attention has been given to the use of available resources in factories where the lighting is really bad and the work is of national importance. It would obviously be false economy to postpone improvements where lighting intensities are below the levels needed for good output, which is still the position in many factories. It is possible to conserve much material by making the best use of existing equipment and by planning installations to avoid re-wiring and additional mains equipment wherever possible. Economies can be effected in other ways such as switching off lights not in use and regularly cleaning lamps, reflectors, walls and ceilings.

Lighting improvements do not necessarily involve an increased consumption of fuel. The rearrangement of installations built up in a haphazard fashion, with the fitting of modern reflectors, will result in great improvement without adding to consumption. Again, with fluorescent lighting, which is now frequently installed for inspection and assembly jobs, better illumination intensities can be obtained without an increase of current consumption. The system can be adapted to existing installations and gives a cool light of low surface brightness with a pleasing near-daylight effect. Against these advantages must be balanced the heavy initial cost of the system and the greater use of materials in restricted supply. The possibility of saving fuel by the removal of black-out screening during daylight is mentioned.

Brief reference is made to the Department's work in the administration of civil defence and fire prevention arrangements. Appendices to the report deal with health (Mr. J. C. Bridge, C.B.E., F.R.C.S.E., Senior Medical Inspector); hours of employment (Miss F. Isabel Taylor, O.B.E., Deputy Chief Inspector); and canteens (Miss D. Johnson, Deputy Superintending Inspector).

Industrial Accidents

Examples Showing Need for Precautions

WITH the entry of so many unskilled and inexperienced men and women into industry it was only to be expected that there would be a rise in the accident rate. This brings with it a necessity for seeing that all the normal precautions are constantly in proper operation as well as the introduction of extra means of preventing employees from doing foolish things to their own detriment.

Education of both employers and workers is involved. So far as the latter are concerned, the cautionary posters which are exhibited in works should be reinforced by lectures on safety measures to foremen and chargehands and if possible to the operatives themselves. Works managements may derive useful guidance from the Royal Society for the Prevention of Accidents whose "Industrial Accident Prevention Bulletin" is now issued by the Ministry of Labour and National Service. Actual cases are likely to prove more instructive than general exhortation and examples quoted from recent issues of the Bulletin may help employers to forestall similar accidents in their own factories.

Additional responsibility is thrown upon works managements by the necessity for high-speed production by inexperienced workers. The mishaps mentioned in these notes will show the kind of accidents that they have to guard against

A very common form of accident nowadays is the catching-up of women's hair in rotating machinery, generally with very serious results. Managements should insist on the wearing of caps by women attending moving machinery. The majority of the cases reported related to unfenced stock bars and led to the imposition of fines upon the firms involved.

Unfenced or imperfectly fenced stock bars have also been responsible for other accidents. In one case an examiner's clothing was caught while he was going through a narrow passage way between stock bars in adjacent lathes, causing injuries. The firm pleaded when prosecuted that the stock did not now reach the works in standard lengths as ordered and it also contended that the examiner had been grossly negligent as hundreds of others had safely passed the exposed bar. Nevertheless, it was fined a total of £10.

Power Press Dangers

Power presses are another common source of danger. In one case reported a woman lost part of a finger when the guard provided for the machine moved out of position because it was loose. The firm maintained that the woman should have used the tweezers provided for passing the work through a hole in the guard, but this was held to be no defence and a fine of £15 was imposed.

Damages of £775 were awarded in another power press case. A young woman found that her press was not operating properly and sent for the charge-hand. He asked where the fault was and, according to the girl, she guided his hand to the spot. The man withdrew his hand at once but the press started immediately and the girl's hand was trapped. The chargehand stated that he had told the girl that the guard was off one side of the press, that he only tripped the press in order to clear obstructions and he did not know that the girl's hand was between the dies.

In a further prosecution for failure to fence a power press it was stated that a guard had been designed but not yet made. The excuses offered were that the job was urgent and that the operator had said that he felt safer when working the press without a guard. The firm was fined £10.

The omission of the guard from a milling machine taken from one department of a works to another led to an accident to a 16-year-old boy. This case draws attention to another possibility which should be guarded against.

Total fines of £75 were imposed on a firm for permitting the operation of an unfenced power press by a boy who had his hand caught, thereby losing a finger and sustaining other injuries. The chairman of the Bench said that it was "iniquitous" that such machines should be left to boys. In his opinion there had been disregard of factory regulations and general laxity.

A somewhat similar instance is reported. Here a girl's thumb was injured on a press fitted with a defective cage guard. It was stated that she had been working the press for two days. She had had no instruction whatever and had picked up the job by watching other girls.

The Bulletin says that the firm had been fined for a similar offence a month earlier. In this case a fine of £20 was imposed for failure to fence securely and £10 for failing to train the girl. The latter was an offence under Section 21 of the Factories Act, as power presses are scheduled in the Dangerous Machines (Training of Young Persons) Order, 1938.

Safe Chain Loads

Ignorance of the requirements of Section 23 of the Factories Act was admitted by a firm in whose sawmill a chain broke while timber was being lifted, the load falling and breaking a man's leg. Investigation disclosed that there was no table of safe working loads for chain slings in the chain store and that there was no chain register in the store. The Bulletin mentions that an alternative to a table of safe working loads is the marking of the safe load on each item of lifting tackle.

A man working on a crane track was killed. The driver said that he had not been informed and was quite unaware that anyone was near the track. The firm admitted in Court that it was somebody's duty to warn the driver and that there had been an omission. It was fined £20, with £5 12s. costs.

Section 26 (1) of the Factories Act stipulates that there must be safe means of access to platforms, etc. A case is reported in which a man fell and was killed while using a ladder which did not reach high enough. A more suitable ladder was available but the magistrate held that there had been a lack of supervision and a fine of £10 was imposed. The Bulletin expresses the view that a ladder can hardly be said to provide safe means of access to a platform if it does not rise well above the landing point.

Accidents frequently occur to men while attending to unfenced machinery and belting. The Bulletin emphasises that any machinery which can be stopped for examination, lubrication or adjustment must be stopped before being approached, even by a machinery attendant.

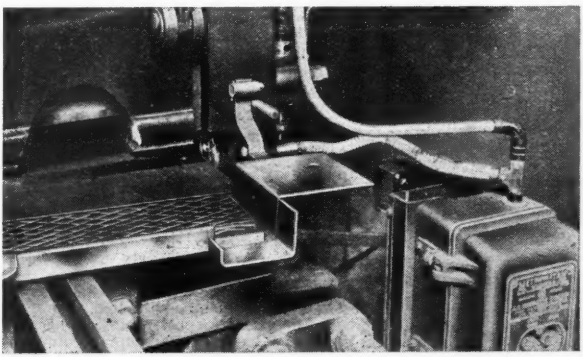
If the machinery cannot be stopped but must remain in motion when the examination is made, the approach is allowed only to a machinery attendant after certain precautions have been taken. These precautions, which include the fencing of certain parts, the erection of a barrier where appropriate, the securing of any ladder used and the presence of an instructed person within sight and hearing, apply equally when lubrication or adjustment are carried out after the examination. If these can be deferred until the machinery is stopped the attendant cannot legally carry them out while the machinery is in motion.

An Effective Safety Device

Interlocked Guard for Power-Driven Guillotines

THOSE responsible for safety measures in factories will be interested in the following notes on an improved form of safety device which has been adopted by the Metropolitan-Vickers Electrical Co., Ltd., for reducing the risk of accidents with power-driven guillotines.

It is customary to fit such machines with a protective guard which, while not obstructing the operation, is designed to protect the operator from accidental injury. Such guards do not all adequately prevent an operator from dispensing with the protection, either when doing a non-standard job, or merely from carelessness or an irrational impulse to circumvent the safeguards provided. The merit of the improved arrangement is that it is proof against any irregular action on the part of the operator, the guard being effectively interlocked with the electrical drive of the machine.



Guillotine guard (removed) showing bracket and convex button which operate the electrical interlock

The guard is a framed sheet of expanded metal, secured in position by a bolt at each end. At its right-hand end is attached a bracket carrying in a cylindrical housing a spring-loaded steel ball which, in the closed position of the guard, depresses a convex button in a recess of the machine to the left of the foot of the bracket. The depression of this button closes contacts connected in the circuit of the driving motor, which thus cannot be started unless the guard is fully bolted into position. If the retaining nuts of the guard are loosened, even by a few turns, the circuit will be broken and the machine rendered inoperative.

This safety interlock has received the approval of H.M. Inspectors of Factories and is being fitted to all the power-driven guillotines in the Metropolitan-Vickers Co.'s works; larger machines have an interlock fitted at each end.

This device is one of many excellent results of the company's "Suggestions Scheme," whereby the co-operation of its employees is sought and used in developing improvements in manufacturing methods.

B†

P.B. Castings

THE British Standards Institution has just issued four specifications providing for two qualities of phosphor bronze ingots and castings. These specifications form part of a series for various non-ferrous castings which is being drawn up at the request of the Directorate of Economy of the Ministry of Supply for economy in the tin used for cast-copper alloys. One of the qualities of phosphor bronze (B.S. 1058-9) corresponds to the phosphor bronze covered by B.S. Aircraft Specification 2B8, and the use of this quality is restricted to essential purposes such as for aircraft work. The other quality (B.S. 1060-1) provides for a leaded phosphor bronze with a lower tin content. Copies of the specifications may be obtained from the Institution, 28, Victoria Street, S.W.1, price 2s. 3d. each, post free.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Wholesaler-Retailers

AS one in the ranks of small contractors, may I draw attention to one of our greatest grievances concerning unfair competition and rivalry in the retail side of our businesses, and one which was not mentioned in the leading article on " Electrical Retailing " in your issue of September 25th.

Just before the war some of the largest wholesalers opened luxurious showrooms, stocked on a scale with which we could not hope to compete. We were told in the first place that these showrooms were for *our* convenience, places to which we could take prospective customers, giving them the benefit of a better selection from which to choose the goods they required. This seemed very nice but in practice we soon found these same " wholesalers " encouraging retail custom direct, thus obtaining for themselves both factors' and " trade " discounts. I know from my own experience the detrimental effect on our annual turnover of this grossly unfair competition.

Surely here is a matter for the Electrical Fair Trading Council to take up. In my opinion it should be made illegal for one firm to do both wholesale and retail business in this way.

RETAILER.

Lighting and Fuel Economy

WE are constantly being enjoined in the public Press and by wireless to economise in the use of fuel by saving electric light. Some of the suggestions made are far from impressive, but illuminating engineers might provide a pointer to a real economy that would follow the removal of all glassware, fabric, parchment or other material interposed between the lamp itself and the area to be illuminated.

In recent years the use of such materials for architectural and artistic purposes, as well as to provide more perfect diffusion of light, has become almost universal. This tempering has a very pleasant effect, but its cost in terms of energy consumption is very high. I would suggest, therefore, that for the duration of the war, the use of enclosed units or other forms of light diffusion between the lamps and the working plane should be compulsorily abandoned and that the wattage of the lamps should at the same time be reduced at least in consonance with the absorbing power of the material removed so as to effect the desired economy.

The use of pearl lamps, which are internally faceted, will prevent injury to the eyesight due to this change, and they entail no loss of light. Quite clear glass absorbs at least 10 per cent. of the light passing through it, as is shown by the increase in daylight value noticeable on opening a window. Official figures of the absorption of coloured glass range from 95 per cent. for cobalt blue, 90 per cent. for ruby and 60 per cent. for white pot opal, though some glasses absorb only 40 per cent.

Applying these figures to everyday illumination, if the glass is removed a 40-W lamp will give as much light as a 100-W lamp enclosed in a heavy opal globe previously gave. An average of not less than 50 per cent. of lost light may be assumed in this type of fitting. Similar reasoning applies to tinted glass and to fabric.

In the year ended March 31st, 1940, the sales of electricity in this country amounted to 22,500 million kWh. Assuming that 12½ per cent. of this was used for lighting, we have a figure of 2,810 million kWh. If one-third of this quantity could be saved by the removal of diffusing media, we arrive at 937 million kWh. The coal consumed in producing this amount of electricity, based on 1·7 lb. per kWh, gives a total of slightly more than 700,000 tons, which at present prices may be valued at £1,200,000. This economy would be affected without any reduction in illumination, though the æsthetic effect in rooms would be, for a time, somewhat impaired.

Edinburgh. BASIL A. PILKINGTON.

Energy and Vegetation

A PASSAGE from the lecture on " Chemistry and Agricultural Reconstruction " which was delivered by Sir E. J. Russell to the Society of Chemical Industries in July relates to a possible source of energy which might ultimately supplement or supersede present forms of fuel. The paragraph is as follows :—

" Mankind is using up at a colossal rate the considerable, but definitely limited, stores of energy accumulated in past geological ages on this earth. Oil and coal are being consumed as rapidly as we can remove them from the earth, and every kind of ingenuity is displayed in devising new methods for more rapid extraction and destruction. But another source of energy is available at present, namely, the sun's radiant energy, which the green plant has the power of fixing and storing. The process is not very efficient from the engineering standpoint, less than ½ per cent. of the energy received being actually stored. But the amount is capable of being increased, and when the supply of energy becomes a problem this possibility will assume real importance."

PERSONAL and SOCIAL

News of Men and Women of the Industry

SOME temporary appointments and changes have just been made in the technical staff of the Belfast Corporation Electricity Department on the recommendation of the city electrical engineer, Mr.W. M'G. Girvan. These include the promotion of Mr. C. M. Cooper from charge engineer to combustion efficiency engineer, Mr. J. Stuart from charge engineer to assistant power station superintendent, and Messrs. S. Wood, J. Stewart and R. Taylor, junior engineers to charge engineers. The city electrical engineer has recommended that applications shall be invited for the appointment of chief technical assistant, that position being vacant since the appointment of Mr. M'Candless as deputy city electrical engineer. The city electrical engineer has reported that so far no arrangement has been made with the Electrical Power Engineers' Association with regard to salaries of technical officers and transfers from the wages list to the salaries list. These negotiations have been going on for some months.

Mr. R. A. S. Thwaites

Mr. R. Alan S. Thwaites has been appointed to the position of deputy chief engineer to the Manchester Electricity Department in succession to the late Mr. J. Harcourt Williams, to take effect from August 1st, 1942. Last December Mr. Thwaites took up the position of assistant deputy chief engineer at Manchester, having previously held the post of engineer and manager to the North Wales Power Co. He has served as a member of the National Consultative Committee of the Central Electricity Board and is a past chairman of the Yorkshire Centre of the Institution of Civil Engineers.

At the invitation of the managers of the Royal Institution, **Sir Henry Dale,** President of the Royal Society, has accepted the Directorship of the Laboratories of the Institution, with the Fullerian Professorship, in succession to the late Sir William Bragg. Sir Henry has expressed the wish that his appointment should be limited to a period of three years, so that the managers may then be free to consider their future policy.

Mr. C. E. Kingston has completed fifty years' service in connection with Leeds electricity supply. He was first employed in 1892 as junior clerk by the Leeds firm of Leonard Cooper, at whose offices the Yorkshire House-to-House Electricity Co., Ltd., was then domiciled. In October of that year he was transferred to the staff of the House-to-House Electricity Co., and continued to serve when the company was taken over by the Leeds Corporation in 1896. It is interesting to note that the present power station occupies the same site as the original works of the House-to-House Co. Mr. Kingston has thus served fifty years "under the same roof." In May, 1925, he was appointed commercial assistant in the Electricity Department, a position which he still holds.

Mr. A. G. Grundy, transport manager of the Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board for the past thirteen years, is due to retire on superannuation, but at a recent meeting of the Board it was resolved that he should be paid the amount of his retiring allowance and re-engaged at his present rate of remuneration as from November 15th. At the end of the present month Mr. Grundy will have completed fifty years of transport service.

Mr. F. W. Godden

Mr. F. W. Godden, whose appointment as engineer and manager of the Coventry city electricity undertaking has now been confirmed by the City Council, served his apprenticeship in the Electrical Engineers' Department, H.M. Dockyard, Portsmouth, from 1918 to 1921, when he joined the Portsmouth Corporation Electricity Department. He was subsequently with the Cheltenham and Poplar Electricity Departments before going to Coventry in 1939 as deputy city electrical engineer.

Mr. R. W. Steel, A.M.I.E.E., deputy city electrical engineer of Norwich, who has been appointed borough electrical engineer and manager at Cheltenham, received his technical education in the Marconi Company's schools in London, at the Wolverhampton and Hanley Technical Schools, and at the North Staffordshire Technical College. He entered the electricity supply industry in 1926, when he joined the Stoke-on-Trent Electricity Department as mains assistant. In 1930 he was appointed assistant mains engineer with the Newcastle and District Electric Lighting Company, and left there three years later to take up the post of technical assistant with the Norwich Corporation. Since going to Norwich he has been successively promoted to chief technical assistant, and deputy city electrical engineer. He also served for nearly three months as acting city electrical engineer during the period between the departure of the former city electrical engineer, Mr. V. A. Pask, and the taking-over by his successor, Mr. J. A. Sumner.

Mr. R. W. Steel

Before entering the electricity supply industry, Mr. Steel had experience in the editorial offices

of the *Wireless World* and later joined Marconi's seagoing staff as a wireless operator. During the later stages of the last war he was twice torpedoed. Subsequently he spent a period as an apprentice at the Wolverhampton works of the Electric Construction Co. and afterwards gained further industrial experience with the British Gas Light Company at Stoke-on-Trent.

Mr. Steel was joint author, with Mr. V. A. Pask, of a paper on "The Development of Electricity Supply in a Rural Area," which was read before the I.M.E.A. Convention at Brighton in 1937. He is a past-president of the Norwich Engineering Society, and was inaugural chairman of the Norwich and District E.D.A. Circle.

Mr. J. N. Aldington, B.Sc., A.I.C., F.Inst.P., of the Preston Research Laboratories of Siemens Electric Lamps & Supplies, Ltd., has been awarded the Leon Gaster Memorial Premium of the Illuminating Engineering Society, for his paper on "Fluorescent Light Sources and Their Application," which was reviewed in our issue of April 17th last.

Mr. R. M. Fairfield, B.Sc., A.M.I.E.E., A.M.I.Mech.E., has been appointed process manager to Callender's Cable & Construction Co., Ltd.

Mr. C. W. Umpleby, consumers' engineer and branch showroom manager at Hexham for the North-Eastern Electric Supply Co., Ltd., has taken up an appointment at the company's head offices at Newcastle-on-Tyne. He has been succeeded at Hexham by **Major G. L. Bradley.**

Mr. C. E. Fairburn, M.A., M.Inst.C.E., M.I.E.E., has been appointed acting chief mechanical engineer of the L.M.S. Railway in the absence of Mr. W. A. Stanier while serving as a full-time technical adviser to the Minister of Production. Before joining the L.M.S.R. in 1934 Mr. Fairburn had been with the English Electric Co. for fifteen years. In 1926 he became general manager of the Dick Kerr Works at Preston, the following year he was also given control of the car works at Preston, and in 1928 he became, in addition, general manager of the Stafford works. In 1931 he was appointed chief engineer and manager of the Traction Department.

Mr. C. E. Fairburn

Mr. O. H. Hosking, A.M.I.E.E., chief assistant engineer and works manager of Watford Corporation Electricity Department, has been appointed chief assistant engineer to the West Midlands Joint Electricity Authority in succession to **Mr. L. F. Jeffrey,** who has become chief engineer to the Authority following the retirement of Mr. J. Morton.

Mr. C. Bentham, chairman and managing director of Henry Simon, Ltd., has been elected president of the British Engineers' Association.

We are sorry to learn that **Mr. J. T. Nettleton** of Benjamin Electric, Ltd., had a serious accident on October 10th which will incapacitate him for a considerable time. He asks business friends to address all correspondence to him c/o Benjamin Electric, Ltd.

Dr. C. C. Garrard and **Mr. J. J. Gracie** have been appointed by the General Electric Co., Ltd., to be joint general managers of the Witton Group of engineering works. At the same time **Mr. J. A. Lacey** has been appointed works manager of the engineering department in succession to Mr. W. Heaton, whose retirement was recently announced. Dr. Garrard has been manager of the company's switchgear works since 1908 when he joined the G.E.C., and Mr. Gracie has been commercial manager at Witton for the last four years.

Dr. C. C. Garrard

Mr. J. J. Gracie

Obituary

Mr. H. E. Rose.—The death occurred recently after a long illness at the age of sixty-three, of Mr. Hugh Edwin Rose, who was an electrical engineer in the London district for seventeen years, and for seven years worked with the L.C.C. as Electrical Supervisor of Estates, Houses and Flats. He was an associate member of the I.E.E.

Mr. F. Garside.—We report with regret the death of Mr. F. Garside, late electrical engineer and manager to the Aldershot Borough Council, which occurred at Aldershot on September 25th at the age of sixty-eight, after a long illness. Mr. Garside received his early training at the Rose Bank station of the Oldham Corporation, and later at the Corporation's Green Hill station, where he became chief assistant engineer.

In 1903 he was appointed engineer and manager of the Aldershot undertaking. In those days the use of electricity in Aldershot was the exception rather than the rule, but under Mr. Garside's able guidance the Department went forward steadily, in face of many difficulties. Ill health caused his retirement in 1937.

Mr. R. B. Creak.—The death is reported, in his eighty-first year, of Mr. Robert Brown Creak, M.I.Mech.E., who was for many years with the Sturtevant Engineering Co., Ltd. Mr. Creak served his apprenticeship at the Crewe locomotive works and subsequently joined Beyer Peacock & Co. Before going to the Sturtevant Co. he was with Henry Simon, Ltd.

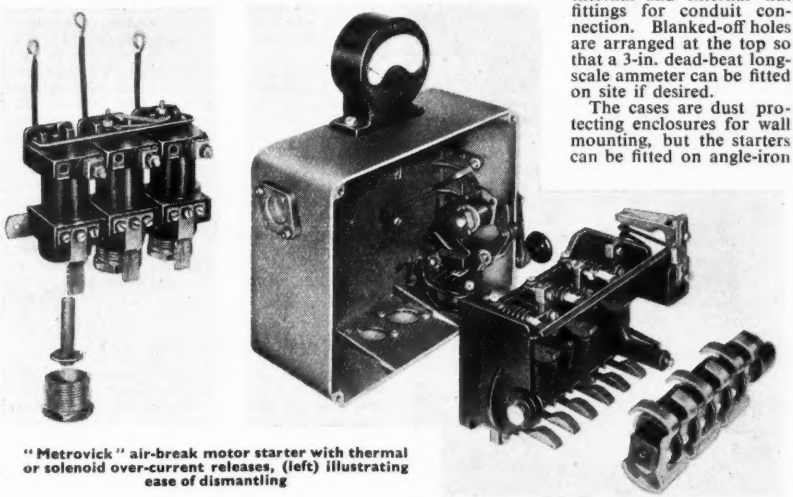
Margaret, Lady Moir.—A memorial service to Margaret, Lady Moir, a past-president of the Electrical Association for Women, whose death was reported last week, was held at St. Margaret's, Westminster, yesterday, Thursday.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Switch Starters

THE range of air-break starters for small squirrel-cage motors recently announced by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, has been designed with particular regard to facility of inspection and maintenance. There are three sizes for 7.5, 12.5, 25 HP, continuously rated at 12, 20 and 40A, star-delta starting. They are insulated for 600 V and comply in all respects with BS. 587/1940.



"Metrovick" air-break motor starter with thermal or solenoid over-current releases, (left) illustrating ease of dismantling

Apart from the overcurrent releases, all the starters are built on similar lines. The smallest size has an overcurrent release of the thermal pattern, the heaters consisting of spirals of special resistance material surrounding bi-metallic strips, which engage with a trip-bar operating contacts in the undervoltage release circuit.

The position of the tripping bar is varied by movement of the pointer against the calibration plate. An additional calibration scale is included for use in hot surroundings, such as in boiler houses, furnace aisles or in the tropics.

On the two larger sizes overcurrent protection is obtained by solenoid relays with non-adjustable dashpots, calibrated in four tripping values.

There is an unusual degree of accessibility. By taking out one screw the drum assembly is removed, and the removal of two more screws enables the base with the fingers, overload releases and trip-bar intact to be taken out after disconnection. The undervoltage release, which remains in position, is of a spring-loaded armature pattern and long creepage paths are provided by the use of mouldings for the fixed and moving contact assemblies.

The terminals are of a clamping pattern to obviate soldering and are reached without difficulty for purposes of installation. The three cable holes are covered by discs, which can easily be drilled to suit cables or replaced by internal and external nut fittings for conduit connection. Blanked-off holes are arranged at the top so that a 3-in. dead-beat long-scale ammeter can be fitted on site if desired.

The cases are dust protecting enclosures for wall mounting, but the starters can be fitted on angle-iron stands for floor mounting where required. All internal parts have a rust-resisting finish. Adaptation of the contact arrangements enables the starters also to serve capacitor motors.

Air-Spaced Cables

High-frequency cables of the "Co-ax" brand made by the TELEQUIPMENT CO., 16, The Highway, Beaconsfield, Bucks., are articulated for flexibility by supporting the inner conductor concentrically inside the outer conductor—a tubular braided shield—by means of specially shaped hollow insulators so that about 85 per cent. of the insulation between the two is air.

The moulded "Megastyrene" insulators are cup-like in shape, fitting into each other like a sequence of ball and socket joints. Therefore the central conductor is only in contact with solid insulating material at intervals, the contact area being very small. Hollow insulators reduce the weight of the cable and minimise dielectric losses.

Radiation is said to be negligible and attenuation and capacity both low; there is complete screening and freedom from kinking, while sturdy construction enables the cable to be handled with ease.

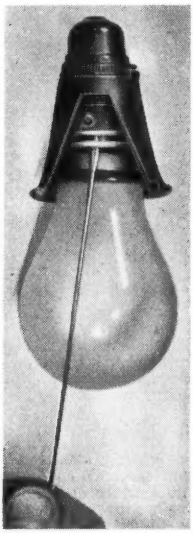
In addition to the usual single type, double or

multiple, parallel or twisted cables are obtainable; a particular kind of parallel cable embodies two or three inner conductors supported on the same insulator. Appropriate terminal collars are provided, or special fixing clip or valve caps can be fitted if desired, for short lengths of cable constructed on the " Co-ax " principle are now specially made-up to form grid connectors of low capacity for linking radio valves to tuned circuits. Special end beads secure the insulators and braided shield in their correct positions to ensure good insulation to the inner conductor at the extremities of the connector.

The outer covering of these cables may be a braided shield, plus varnished cotton, or tough rubber, a flexible plastic skin, rubber and lead, copper tubing, or flexible metallic tubing.

Tilt-Washer Lamplock

A neatly contrived lamp-locking device has been specially designed to overcome the awkward problem of adequately securing lamp bulbs in holders that are skirted for shielding purposes or where lampshades are used that are too long and narrow for easy access. It has been provisionally patented by Mr. C. MANCHA - BENNETT, M.I.E.E., Ergon House, Horseferry Road, Westminster, London, S.W.1, who has designed other types of lamp-locks as well as the lock-ing nuts now much used in aircraft construction.



Skirted lampholder with shield cut away to show tilt-washer locking device and key

The simplicity of the tilt - washer arrangement can be observed from the illustration, which indicates that there is no necessity to register the locking screw in any special position. Removal of the locked-in lamp bulb by an authorised person is accomplished with the aid of a special key consisting of a semi-flexible slender steel rod terminating in a miniature box-spanner tip.

Twin tilting washers are first bayoneted on to the lamp cap which, in turn, is then itself bayoneted into the lampholder in the usual manner. The special key is next utilised to rotate the locking grub screw, which has the effect of tilting one of the washers, the pair being hinged diametrically opposite by a loose rivet, thus filling the space between the lamp-cap shoulder and lampholder mouth so that it is impossible to lift the bulb in order to half-turn it for freeing the pins from the bayonet slots for withdrawal from the holder. No damage is caused by the operation of the locking device either to the lamp cap or holder. The lock is believed to be the only one that can be constructed entirely of insulating material, although it may be made of metal if desired.

X-Ray Generators

The " Double-Twin " generator of high voltage evolved by WATSON & SONS (ELECTRO-MEDICAL), LTD., 76, Castle Street, Reading, Berks, is primarily intended for the energisation of shockproof X-ray tubes of the double-focus type, but its design enables it to be used initially in conjunction with an existing single-focus tube, while full provision is also made for its employment to energise the stator winding of a rotating anode tube, the use of which is tending to become more general.

The generator outfit is made up of a two-valve rectifier and mobile control table with exposure switches, both hand and foot manipulated, together with a junction box for the various power cables and leads to electrically operated auxiliaries.

While the apparatus is basically the same as the original model introduced in 1940, certain modifications that have resulted from operating experience and changes in manufacturing methods necessitated by wartime conditions are described in illustrated publication No. 21 (second edition, series CT), a limited number of copies of which can be issued on loan to customers.

Forthcoming Events

Institution of Electrical Engineers.—Monday, October 26th, 5.30 p.m. Informal discussion on " Space and Domestic Water Heating for Post-war Buildings," to be opened by the President.

Measurements Section.—Friday, October 23rd, 5.30 p.m. Inaugural address by the chairman, Mr. E. H. Miller.

North-Midland Centre.—Saturday, October 17th, 2-30 p.m. Great Northern Hotel, Leeds. Address by the Chairman, Mr. W. Fordham Cooper, B.Sc. (Eng.)

North-Western Students' Section.—Saturday, October 17th, 2.30 p.m. Engineers' Club, Albert Square, Manchester. Address by the Centre chairman, Mr. L. H. A. Carr, M.Sc.Tech.

South Midland Centre.—Saturday, October 24th, 12.30 for 1 p.m. Grosvenor Room, Grand Hotel, Birmingham. Wartime lunch and addresses by Prof. C. L. Fortescue (President, I.E.E.) and Mr. R. H. Rawll (Centre chairman). Applications for tickets (7s. each) should be made to the hon. secretary by October 17.

West Wales (Swansea) Sub-Centre.—Saturday, October 24th, 3 p.m. Mackworth Hotel, High Street, Swansea. Inaugural address by the new chairman, Mr. A. C. Thirtle.

Association of Supervising Electrical Engineers.—Tuesday, October 20th. E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2. 5.45 p.m. Two films entitled " Hydraulics " and " Transfer of Power." 6.15 p.m. Presidential address by Mr. H. W. Swann, M.I.E.E.

Institution of Mechanical Engineers.—Saturday, October 17th, 2.30 p.m. Engineers' Club, Manchester. Paper on " Fans—Their Types, Characteristics and Applications," by Mr. C. G. Ferguson. (I.E.E. members invited.)

COMMERCE and INDUSTRY

Waste Paper Salvage. Small Switchgear Supplies.

"Essential" Records

WE have no doubt that the large majority of electrical manufacturers, contractors and supply undertakings have been doing a great deal towards the saving of paper during the past two years. But there must be many who have not yet reached the limit of their endeavour and so the reminder of the importance of the subject provided by the formation of the Electrical Industry Waste Paper Recovery Committee is not superfluous.

The Committee, as we have reported, sets out with the aim of securing 5,000 tons of waste paper by the end of the year—a fairly impressive figure but by no means impossible of attainment. Concerns who consider that they have already disposed of all disposable paper should make another survey. It is surprising how, under the pressure of necessity, the essentiality of old records begins to diminish. Let readers consider how very infrequently it is necessary to refer to such collections of old documents and take the small risk of letting them go.

Any problems connected with collection will be solved by the Committee, whose address is 2, Savoy Hill, W.C.2.

Contracting as "Essential Work"

The Ministry of Labour has made the Essential Work (Electrical Contracting Industry) Order (S.R. & O. 1942 No. 2071, price 3d.) which comes into force on October 19th. This provides for the scheduling of any electrical contracting undertaking if it is considered expedient to do so. An undertaking before being scheduled has to observe conditions relating to the payment and conditions of employees and must have adequate provisions for training where it is considered necessary.

Such undertakings may not dismiss employees (except for serious misconduct) without permission of a national service officer and permission is also required by an employee to leave his employment. It is provided that such permission is not necessary where a specified person is caused to give his services for urgent work in some other undertaking for not more than 14 days or in another schedued undertaking for not more than seven days. The Order also specifies that a guaranteed wage shall be paid and defines the conditions. The usual provisions regarding discipline, records, appeals, etc., are included.

Power is taken to give directions as to the duration and situation of employment, operating on a monthly basis, but it is stated that no restrictions of this nature shall exist until a direction is given. This qualification aims at preserving the mobility and flexibility which are considered essential to the operation of the industry.

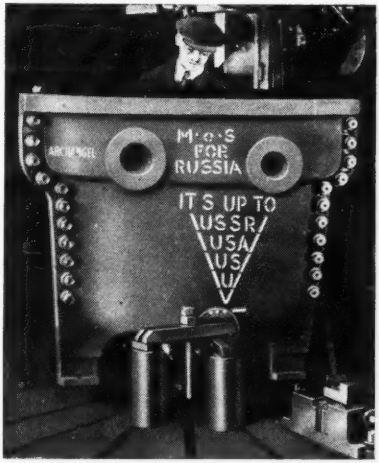
Control of Manufacture

The Board of Trade reminds firms employing less than five people on the production of various items of general merchandise that certain controls and prohibitions of manufacture introduced on August 1st for firms employing five people or more, became applicable to smaller firms from October 1st. All manufacturers now require a licence to make and supply a large range of consumer goods, other than clothing, including hollow-ware and kitchen hardware, metal furniture, domestic electrical appliances, etc.

"Control of Manufacture and Supply," a 12-page booklet giving information on the industries and classes of goods covered by these regulations is obtainable through any bookseller or newsagent or direct from the Stationery Office, York House, Kingsway, London, W.C.2, price 2d. (post free 3d.). Inquiries regarding the Orders effecting these controls and prohibitions and the Limitation of Supplies should be addressed to the Board of Trade, I.M.4 Department, Millbank, London, S.W.1.

Helping the Russians

The accompanying illustration shows some equipment made by a well-known electrical engineering concern for dispatch to Russia.



An apt slogan

It will be seen that an opportunity was taken to stencil a "Go to it" slogan in novel form.

Fire Prevention Instructions

The Electricity Commissioners have circulated to electricity undertakings a memorandum upon the Civil Defence (Compulsory Enrolment) and Fire Prevention (Business Premises) Orders, with particular reference to the employment of women for fire-watching.

It is mentioned that in all cases where women employees are included in the rota the squads

should contain not less than one-third of male employees and at least two women. Separate accommodation must be provided for each sex and wherever it is possible, without unreasonable demands upon material and labour, or an undue use of fuel and light, conditions should be made as comfortable as possible for those who are called upon to do night duty after a full day's work.

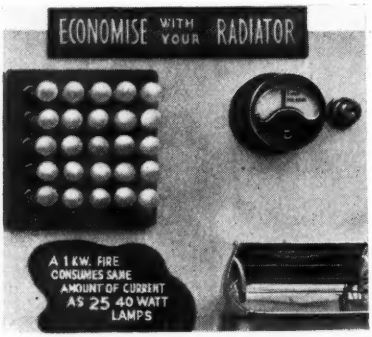
A code relating to amenities for women fire guards has been prepared by the Ministry of Home Security and copies are to be sent to electricity undertakings as soon as possible. The memorandum also refers to the training of fire guards, methods of dealing with incendiary bombs and compensation for loss of or damage to clothing.

Boys for the Contracting Industry

In reply to questions by members of the Electrical Contractors' Association, the Director (Mr. L. C. Penwill) says that he has obtained a ruling from the Ministry of Labour and National Service that boys entering the electrical contracting industry straight from school are covered by the Electrical Installation (Restriction on Engagement) Order, 1941. They must therefore be engaged through an Employment Exchange. The Order does not debar a prospective employer from making inquiries of the school authorities regarding suitable boys.

Birmingham Fuel Exhibition

A fuel exhibition was recently held in Birmingham in which the Corporation collaborated with the Ministry of Fuel and Power and the Ministry of Information, colliery interests and the coal trade. The Electric Supply Department's



Part of the Birmingham Electric Supply Department's exhibit at the recent local fuel exhibition

exhibit took the form of practical demonstrations of the most effective way in which domestic consumers could reduce their consumption of electricity. In view of the exhortations by the authorities to reduce lighting consumption by switching off lamps when not required, an interesting feature of the Department's exhibit was a demonstration which called attention in a convincing manner to the far greater economy which can be effected by cutting out the unnecessary use of a single radiator as compared with switching off a few lamps. This consisted of a bank of twenty-five 40-W lamps and a 1-kW radiator connected to a change-over switch in circuit with an ammeter registering " one unit per hour." By operating the changeover switch it was demonstrated that the radiator consumed the same amount as the bank of twenty-five lamps.

Restrictions on the Location of Industry

By the Location of Industry (Restriction) Order (S.R. & O. 1941 No. 1100), industrialists were placed under the obligation, in the case of premises of 3,000 sq. ft. or over, of obtaining a licence from the Regional Offices of the Control of Factory and Storage Premises before changing the use to which a factory or warehouse was put, or using any premises of that size for purposes of production or storage.

By a new Order, Location of Industry (Restriction) Order (S.R. & O. 1942 No. 2072), which revokes the 1941 Order, a licence must now be obtained whatever the size of the premises. Goods may be temporarily stored for 28 days without a licence under the existing General Licence, which remains in force. Licences issued under the earlier Order remain valid. Again no application for a licence need be made in order to continue to carry on business in premises which were exempt under the earlier Order. The new Order came into force on October 12th, and copies are obtainable from the Stationery Office (price 1d. or 2d. post free). Further information concerning the scope of the Order may be obtained from the Regional Offices of the Control of Factory and Storage Premises, or from local Chambers of Commerce.

Accessories for Civil Purposes

Negotiations between the National Electrical Contractors' Trading Association, Ltd. (N.E.C.T.A.) and the Board of Trade have resulted in arrangements by which the Board will approve the supply of small switchgear for " civil purposes." This means requirements not already included in approved categories and comprising mainly essential requirements of factories engaged in the production of goods essential for the civil population, necessary repairs and maintenance of existing essential services (lighting, heating and cooking) in private and commercial premises and necessary new installations in these premises.

Manufacturers are now engaged in giving such information as the Board of Trade requires and thereafter the appropriate licences will be issued.

The term " small switchgear " covers air-break switches, fuses, distribution boards, plugs and sockets for all current ratings up to and including 60A.

Economy in Building Materials

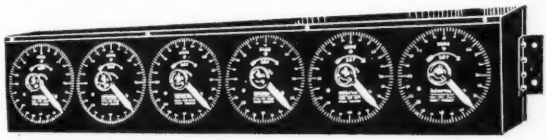
To secure a saving of materials in building the Committee on Building Materials Standardisation of the Ministry of Works and Planning has issued a series of memoranda suggesting suitable more easily obtained alternatives for materials in short supply. The bulk of the information is only of indirect interest to the electrical industry, but one memorandum (E.M.4) which aims at securing economy in the use of cast-iron suggests that this metal shall be replaced by steel or faience in the construction of electric

fires. Many fire manufacturers, of course, had already adopted steel in lieu of cast-iron before the war for much of their production with a view to cutting down weight.

Synchronous Process Timers

The range of automatic process timers manufactured by LONDEX, LTD., 207, Anerley Road, Sydenham, London, S.E.20, has been increased by a new type PR/KZ fitted with up to six dials driven by one common self-starting synchronous motor.

This equipment makes it possible automatically to control six processes independently. Setting is carried out by rotating a pointer (shown on the accompanying dial illustration) to the desired time interval; at the end of the set time the pointer will have returned to zero.



Multiple process timer

This device is especially suitable for multiple process timing in the chemical industry where it is being used for opening and closing valves, starting and stopping pump motors and operating conveyor belts at pre-determined times, or repeating operations on any number of circuits. Adjustment can be easily effected and the total cycle can be seconds or any number of hours.

New Essential Work Order

The Minister of Labour and National Service has made a new order consolidating the Essential Work (Building and Civil Engineering) (No. 2) Order, 1941, and the Essential Work (Building and Civil Engineering) (Amendment) Order, 1942. The Order incorporates certain amendments which have already been made in the General Provisions Order.

Among these new provisions is one which secures that workers are not disentitled to the guaranteed wage in respect of time spent in attending appeal board hearings when they appeal successfully against suspension or dismissal for serious misconduct. Also, the existing provision that the guaranteed wage is payable during the interval between dismissal for serious misconduct and reinstatement after successful appeal is now extended so that a worker is not disentitled to the guaranteed wage if he takes temporary employment in the interval. Any sums earned in respect of the temporary employment are to be deducted from the guaranteed wage payable by the original employer.

In addition to certain minor amendments of an administrative character, provision is made for the exclusion of part-time workers who have entered industry because of war time conditions. These amendments have been made in agreement with representatives of both sides of the building and civil engineering industries. Copies of the Order (S.R. & O. 1942 No. 2044) can be obtained from the Stationery Office (price 4d.).

Contract Price Adjustment Formulæ

We are informed by the British Electrical and Allied Manufacturers' Association that for purposes of calculating variations in (*a*) "Rates of Pay," the rate for adult male labour at October 12th shall be deemed to be 80s. 6d.; (*b*) "Costs of Material," the index figure for Intermediate Products last published by the Board of Trade on October 12th was 169·4 and is the figure for the month of September, 1942.

Photography in Science and Industry

To illustrate the growing importance of photography in industry and scientific research the Association of Scientific Workers is promoting an exhibition which will be held during November in the rooms of the Royal Photographic Society at 16, Princes Gate, S.W.7. The exhibition will be opened on October 31st, by Sir Robert Watson-Watt, F.R.S., with Mr. D. McMaster, president of the Royal Photographic Society, as chairman. The field to be covered will be wide and will have particular reference to the war effort, including work on machine movement analysis, radiography o :castings, etc., mapping and surveying, nuclear physics, template making, etc. The exhibitors will include Government Departments, the photographic industry and individual technicians.

More Parcels for Prisoners

In the first eight months of 1942 the Red Cross and St. John War Organisation sent more than 3½ million parcels for British prisoners in Germany and Italy at a cost of well over £2,000,000. In future it is expected that dispatches will average over 600,000 a month compared with 335,138 last January. Each week contributions to the Red Cross Penny-a-Week Fund from 10½ million men and women workers are helping in large measure to defray the cost of this essential humanitarian service, but a greatly increased effort is needed to ensure that it shall not be hampered by inadequate resources. Those wishing to help should write to the Red Cross Penny-a-Week Fund, Bramshill, near Basingstoke, Hants.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have the following information:—

Address of Immersion Heaters, Ltd.

Makers of "Defiant" gastight fittings.

ELECTRICITY SUPPLY

Control at Ashton. Derby and Maidenhead Reductions.

Ashton-under-Lyne. — NEGOTIATIONS WITH STALYBRIDGE BOARD.—The Town Clerk has informed the Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board that the Corporation is not prepared to part with its electricity undertaking and not have a voice in the distribution of electricity in the town. At the same time he expressed the Corporation's thanks for the offer to allow Mr. J. H. Lumsden, the Board's chief engineer, to act in a temporary supervisory capacity during the negotiations. The Board has agreed to continue negotiations, but points out that the acquisition of the Corporation's undertaking under the Board's existing powers is not incompatible with the Corporation's desire to have a voice in the policy of distribution of electricity in Ashton.

Birkenhead.—LOANS.—The Electricity Committee has obtained sanction to borrow £3,500 for consumers' apparatus and is seeking sanction to borrow £500 for electric motors.

Coventry.—SUBSTATION EQUIPMENT. — The Electricity Committee is to purchase substation equipment at an estimated cost of £1,514.

Derby.—REDUCTION OF CHARGES.—At the last meeting of the Town Council approval was given to the decision of the Electricity Committee to allow a discount of 5 per cent. on all accounts for electricity, including the charges for the hire of apparatus.

Glasgow.—PROTEST AGAINST HEATING BAN.—The City Council is protesting against the Order prohibiting central heating during the present month in non-industrial premises in the interests of fuel economy. It is contended that owing to weather conditions Scotland suffers from such a restriction in a manner not appreciated in the south.

Huddersfield.—GUARANTEED MINIMUM PAYMENTS.—It has been resolved that the guaranteed minimum payment required from any domestic consumer because of extra cable laid to provide a supply to the premises shall be limited for the duration of the war to 20s. per annum.

CONSTRUCTION OF SUBSTATION.—The borough electrical engineer has been authorised to proceed with the construction of a substation in order to relieve or replace an underground substation.

London.—POPLAR.—The Electricity Committee is to lay an e.h.v. link at an estimated cost of £3,100.

Maidenhead.—ALLOCATION OF SURPLUS.—The annual accounts for 1941-42 were presented to the Electricity Committee recently and the electrical engineer (Mr. C. A. Britton) reported on the year's working. Arising out of the report it was resolved that approximately £10,000 of the net revenue balance should be used to defray the cost of capital works now in hand, and that application should be made to the Electricity Commissioners for their consent.

PRICE OF ELECTRICITY.—In reviewing the accounts the Committee was informed by the electrical engineer that tariff concessions to the extent of about £3,000 per annum could be introduced. It was felt that as existing tariffs were somewhat complicated it would be beneficial to utilise the concessions to bring about a general simplification. Also under present conditions the business premises two-part tariff was becoming unworkable, and it was agreed to replace it by a block tariff. The following tariff modifications were approved:—

Domestic flat rate: In future primary kWh will be on a quarterly and not an annual basis and calculated as follows: Rateable values up to £20, first 25 kWh per quarter. Above £20, 1¼ kWh per £ of r.v. per quarter for the first £40 and 1 kWh per £ for the next £20. Above £60, ¾ kWh per £. Should the quarterly consumption be less than the calculation of primary kWh the actual consumption is to be charged at the primary rate. Two-part tariff: The standing charge on the first £20 of rateable value is to be reduced from one-sixth to 15 per cent.

Business and industrial tariffs (quarterly account):—Flat rate: The special charge of 8d. per kWh on the first 10 kWh per quarter used for power and heating is to be abolished. The two-part tariff is to be replaced by the following block rate:—Within the borough: First 15 per cent. of kWh per quarter, or 100, whichever is the greater, at 4½d. per kWh, and the remainder at ¾d. Ex-borough area No. 1: 5d. and ¾d. Ex-borough area No. 2: 5½d. and 1d.

Prepayment power and heating supplies are to be subject to a rebate of 1d. per kWh within the borough and ½d. in ex-borough area No. 1.

Mansfield.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £1,500 for mains and services.

Northern Ireland.—DOMESTIC TARIFF AND ECONOMY.—At a meeting of Londonderry City Council reference was made to the position, with regard to electricity economy, of consumers charged under the fixed domestic rate. Councillor S. Orr instanced the case of a consumer paying for six lights who might be anxious to help by using only four of those lights, but who, nevertheless, would be charged for the full number. He maintained that in such a case the consumer should be charged for the amount of electricity used, instead of paying the fixed domestic rate. Councillor J. H. Welch, M.B.E., pointed out that consumers could change from the domestic to the ordinary rate if they desired.

Scarborough.—" ALL-IN " BUSINESS TARIFF.—The borough electrical engineer has reported to the Town Council regarding Scale " B " of the all-in tariff for supplies of electricity to business premises. It has been decided to make no alteration in the fixed charges of existing agreements, but consumers who are at present on this scale are to be allowed to transfer, if they wish, to the flat rate of charges for electricity without giving the notice specified in the agreements.

Watford.—HIRE CHARGES.—Having received a report from the chief engineer and general manager (Mr. A. W. Barham) that, due to increases in the cost of labour and materials, the hire charges for electrical apparatus were insufficient to meet the outgoings to the extent

of approximately £1,600, the Electricity Committee has directed the town clerk to ascertain the legal position in regard to a withdrawal of the present 10 per cent. rebate allowed on hire charges. Subject to the Corporation's having legal power, the Committee recommends the withdrawal of the rebate.

IMPROVING SUPPLIES.—The Electricity Committe has obtained the Electricity Commissioners' sanction to borrow £8,767 for mains and £4,187 for substation equipment for improving supplies.

Overseas

Eire.—DEARER ELECTRICITY?—During the last financial year the Electricity Supply Board imposed a 10 per cent. increase in the cost of electricity for domestic consumption, water heating and cooking. Sanction is now being sought by the Board to another rise of 10 per cent. to meet the increased cost and inferior quality of coal, and counterbalance the fall in revenue through rationing of domestic and industrial consumption. Should the increase be authorised it will probably be applied in November, when the average cost to the consumer will advance from 0·825d. to 0·9d. per kWh. This year the Board has used less coal, quantitatively than in 1941, but double the pre-war quantity was used per kWh. Next year the Board will have additional expenses due to a pension scheme.

Spain.—HYDRO-ELECTRIC PLANT EXTENSION.—In order to meet the increasing demand for power supplies, the Sociedad Hidroelectrica Espanola has recently been authorised to install a new turbine and alternator of 25,000 kVA capacity at its power station on the River Jucar at Millares.

TRANSPORT

Rumania.—RAILWAY ELECTRIFICATION PLAN.—Reports from Bucharest state that the Director-General of the State Railways has been charged with the task of working out a plan for the electrification of the Rumanian Railway network. Coal, which is generally scarce in Rumania, will thus be saved by the use of electric power. The first work to be carried out will include the building of a dam at Bistrit (Moldavia) and an underground power station. The work is considered to be in the interests of the State as well as of military importance. The Director-General has been empowered to expropriate the property necessary for the execution of the scheme. The whole project will be in charge of a Director of Electrification.

Slovakia. — RAILWAY CONVERSION. — The Government has decided to electrify all its principal railway lines. Work has already started on the Sillein-Zipser-Neudorf line which will take three years to complete.

Wolverhampton. — TROLLEY-BUSES. — The Transport Committee is to purchase six double-deck trolley vehicles at an estimated cost of £20,000.

South Shields.—NEW TROLLEY-BUS SERVICES.—The Corporation's latest trolley-bus route extension from Marsden Road to Tyne Dock has been opened. In July a service connecting Laygate with Slade Terrace was inaugurated.

Wartime Boiling Plates

IT was recently reported in the *Electrical Review* that at a meeting of the E.D.A. Electric Cooking Committee the manufacturers' representatives had urged that in order to save labour and material a new design of open boiling plate should be produced as a wartime measure. This would consist of a ceramic moulding grooved to take open wire spirals, similar to those produced for A.R.P. and other purposes, but of the standard 8-in. size with fixings and connections such as to make it interchangeable with existing solid plates. It was considered that the latest nichrome wire and ceramic material used in a well-drained moulding should ensure reasonable life provided there were not continued misuse.

It was agreed that as the manufacturers were willing to incur jointly the cost of the necessary tools some sample plates should be made and tested in ordinary domestic use.

As an outcome of this decision ten leading cooker and boiling plate manufacturers have announced the introduction of the " Sesame " boiling plate for replacement purposes. The principal points are interchangeability with all 8-in. round plates supplied by the ten manufacturers; a loading of 1,750 W; a boiling speed comparable with that of existing types of plates (3 pints in 13½ minutes with average pan); three-heat control connections; and easily-replaceable element coils.

The new " Sesame " boiling plate

There are two types: " S " to replace solid plates, available immediately, and " R " to replace radiant plates, available shortly. It is emphasised that the new plate has been developed to meet an emergency and to relieve the delivery situation of existing types caused by present manufacturing difficulties. As it has been designed purely as an emergency plate it does not carry the manufacturers' usual guarantee.

The companies participating in this development are Belling & Co., Ltd., De Brunner & Lang Sims, Elexcel, Ltd., the English Electric Co., Ltd., the General Electric Co., Ltd., the Hotpoint Electric Appliance Co., Ltd., the Jackson Electric Stove Co., Ltd., the Metropolitan-Vickers Electrical Co., Ltd., the Revo Electric Co., Ltd., and the Simplex Electric Co., Ltd.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The Nigerian Electricity Supply Corporation, Ltd.—After providing for depreciation, the profit for 1941–42 is £177,794, against £147,719 in 1940–41. The final dividend of 4 per cent. maintains the year's distribution at 8 per cent., and £10,322 (against £4,395) is carried forward. In a statement issued with the report the chairman refers to the unfair incidence of excess profits tax upon companies like this, which are dependent upon wasting assets. In their case the tin mines are practically their only customers. The mines are being urged to increase production to the utmost with the result that their economic life is being shortened. As past deficiencies set against E.P.T. have now been wiped out the net amount of earnings during the current year will be reduced.

The Power Corporation of Canada, in its report for the year ended June 30th last, states that gross earnings declined from $1,607,506 to $1,571,732. Expenses were $227,996, as compared with $231,750, while taxes increased from $48,772 to $57,720, net earnings totalling $1,286,016 ($1,326,984). Interest absorbs $488,199 ($493,137), leaving a surplus of $797,817 ($833,847). A sum of $2,061,265 ($2,007,357) is carried forward.

The Brazilian Traction, Light & Power Co. has declared a further dividend of 60 cents per share on the no-par-value ordinary shares. This raises the total for the past year to $1, as compared with only 40 cents for 1941.

The Cables Investment Trust, Ltd., reports a net revenue for the year to June 30th of £220,913, as compared with £225,097 for the preceding year. The final dividend is 3 per cent., making 5 per cent. for the year (unchanged), and £201,965 is carried forward (against £171,052 brought in).

Electric & Musical Industries, Ltd., in a preliminary statement, says that the accounts for 1941-42 will show a profit of £153,560, an increase of £26,979 as compared with the previous year. The dividend for the year on the ordinary stock is maintained at 6 per cent.

Callender's Cable & Construction Co., Ltd., is maintaining its interim ordinary dividend at 5 per cent.

The Atlas Electric & General Trust, Ltd., announces the payment of the interim dividend (3½ per cent.) on the 7 per cent. cumulative preference shares.

Thos. W. Ward, Ltd., propose to pay a final ordinary dividend of 7½ per cent., maintaining the distribution for the year at 11¼ per cent., less tax.

The Ever Ready Trust Co., Ltd., has declared an interim dividend of 3 per cent. (same) on both the ordinary and the deferred shares.

The River Plate Electricity & Other Securities Corporation is maintaining its interim dividend at 2 per cent.

The Paterson Engineering Co., Ltd., has announced a first and final dividend of 10 per cent., plus a bonus of 2½ per cent. (same).

The British Thermostat Co., Ltd., is again paying an interim dividend of 7½ per cent.

Pinchin, Johnson & Co., Ltd., are again paying an interim dividend of 2½ per cent. upon their ordinary shares.

Ransomes & Rapier, Ltd., have again declared an interim dividend of 2 per cent., free of tax.

The Rawlplug Co., Ltd., is maintaining its interim ordinary dividend at 10 per cent.

New Companies

Accurate Controls, Ltd.—Private company. Registered October 3rd. Capital, £2,000. Objects: To carry on the business of manufacturers of, and dealers in, instruments and equipment for the control of electrical, steam, hydraulic, hydro-electric, gas or other power plant; scientific, motor, marine, radio and general engineers, etc. Subscribers: R. N. Reid, "Dell Quay," Coombe Lane, Kingston-on-Thames, and H. Bulstrode, 37, Castle Avenue, Ewell, Surrey. Registered office: Windsor House, Victoria Street, S.W.1.

Radiovision Services (Norbury), Ltd.—Private company. Registered October 3rd. Capital, £250. Objects: To carry on the business of radio service engineers, repairers of radio and electrical appliances, etc. Directors: E. Cox, 88, Godalming Avenue, Wallington, Surrey, and N. P. Mitchell, 94, Arundel Avenue, Sanderstead, Surrey. Registered office: 1451 London Road, Norbury, S.W.16.

Trumend Radio & Electrical Repairs, Ltd.—Private company. Registered September 30th. Capital, £100. Objects: To carry on the business of repairers and manufacturers of, and dealers in, gramophones, wireless sets and accessories, electrical goods, etc. L. Tree, 147, Benhurst Avenue, Elm Park, Romford, Essex, is the first director. Registered office: 245, Oxford Street, W.1.

Kenneth B. Caplin & Co., Ltd.—Private company. Registered September 23rd. Capital, £510. Objects: To acquire the business of a wireless and electrical dealer and electrician carried on by Kenneth Caplin at Fair Oak, Hants. K. Caplin, 38, Witt Road, Fair Oak, is the first director. Registered office: 38, Witt Road, Fair Oak, near Eastleigh, Hants.

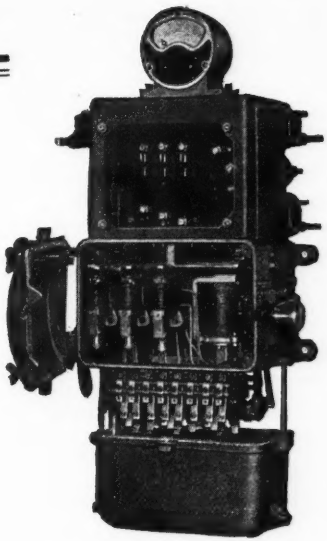
M. H. Hodgson, Ltd.—Private company. Registered September 23rd. Capital, £1,000. Objects: To carry on the business of electrical, motor and general engineers, dealers in electrical goods and motor spare parts, ironmongers, etc. The directors are M. H. Hodgson, 86, Great Portland Street, W.1 and A. A. H. B. Halford, 3, Spenser Road, Herne Hill, S.E.24. Registered office: 86, Great Portland Street, W.1.

Potter (Sound) Systems, Ltd.—Private company. Registered September 24th. Capital, £1,000. Objects: To carry on the business of

CONTROL

Immediate Despatch

Up to 50 H.P., 400/440 VOLTS



Oil Immersed Star-Delta Starter

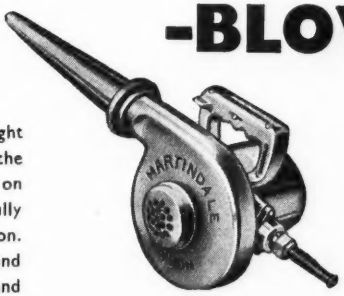
VERITYS LTD.

ASTON, BIRMINGHAM 6

Sales Headquarters :
BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2

MARTINDALE

"SUPER -BLOWERS"



The most efficient lightweight portable blowers ever put on the market. Precision-built, on interchangeable lines, carefully balanced to eliminate vibration. Armatures and coils hand-wound and impregnated to withstand all conditions of service all over the world.

Write for literature.

Three models (1) "Mill-type"
(2) Standard
(3) "Blower-Clean"

All models can be instantly converted into powerful industrial vacuum cleaners.

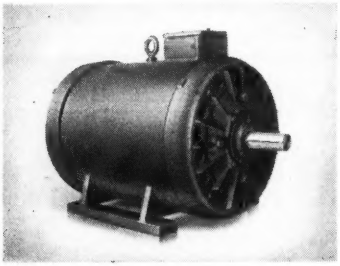
MARTINDALE ELECTRIC CO. LTD., Westmorland Road, LONDON, N.W.9

Telephone : Colindale 8642-3 *Telegrams : Commstones, Hyde, London*

WE ARE NOT AMUSED

We have all laughed at the clever advertisements of those well-known makers of—of something or other of which the name escapes us for the moment. Actually, this series is an obvious get-out for the advertising manager ; for it is always much easier to write amusing copy than to make plain facts readable—easier for advertising men, of course, who are rather funny by nature.

We rarely roll on the floor helpless with laughter at anything we write about L.S.E. motors. An occasional brilliant flash of wit is all we permit ourselves. We see nothing amusing, for instance, in the fact that we have a remarkably complete range of A.C. and D.C. motors; the excellence of the N.S. variable-speed A.C. motor gives us satisfaction but no cause for mirth. We have a serious job of work to do ; but we are grateful to the people (what *is* their name ?) who spend a lot of money to make us smile.



The "Emcol" totally enclosed fan-cooled motor laughs at dust, dirt, swarf, etc.

LAURENCE, SCOTT & ELECTROMOTORS LTD.

Who have given their serious attention to the manufacture of electric motors for nearly sixty years.

NORWICH • MANCHESTER • LONDON AND BRANCHES

manufacturers and repairers of, and dealers in, wireless sets, sound and vision reproducing and amplifying instruments, cinematograph machines and electrical goods ; proprietors of battery service and charging stations, etc. Directors : F. G. Potter and Mrs. I. V. Potter, both of 43, Beauchamp Avenue, Birmingham, 20. Solicitors : Lyon Clark & Co., Midland Bank Chambers, West Bromwich.

Gordon Grubb, Ltd.—Private company. Registered September 20th. Capital, £500. Objects : To carry on the business of electrical, mechanical and radio engineers, tool makers, etc. Directors : J. C. Gordon, Hillcrest, Radlett, Herts and S. E. Grubb, Manor Cottage, Manor Park, Chigwell. Registered office : 44-46, Leadenhall Street, E.C.3.

Companies to be Struck Off the Register

The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary :—Radio & Electrical Maintenance, Ltd. ; Bewicke Radio Services, Ltd. ; Faraday Allwave Wireless, Ltd. ; Interocean Radio, Ltd. ; and Rapid Electric Arc Welding & Metals Co., Ltd.

Companies' Returns

Statements of Capital

Babcock & Wilcox, Ltd.—Capital, £4,620,000 in 100,000 6 per cent. preference, 200,000 5 per cent. second preference and 4,320.000 ordinary shares of £1. Return dated June 11th. 100,000 6 per cent. preference, 179,056 second preference and 4,299,656 ordinary shares taken up. £1,029,884 paid on 179,056 second preference and 850,828 ordinary shares. £3,548,828 considered as paid on 100,000 6 per cent. preference and 3,448,828 ordinary shares. Mortgages and charges : Nil.

Urban Electric Supply Co., Ltd.—Capital, £1,050,000 in 2,800,000 ordinary shares of 5s. and 350,000 preference shares of £1. Return dated May 13th. 700,000 ordinary and 350,000 preference shares taken up. £356,256 5s. paid on 425,025 ordinary and 250,000 preference shares. £168,743 15s. considered as paid on 274,975 ordinary and 100,000 preference shares. Mortgages and charges : Nil.

East Anglian Electric Supply Co., Ltd.—Capital, £1,000,000 in £1 shares (40,000 preference and 960,000 ordinary). Return dated May 12th (filed June 10th). 2,581 preference and 600,000 ordinary shares taken up. £563,419 paid. £39,162 considered as paid. Mortgages and charges : £750,000.

Cornwall Power Co., Ltd.—Capital, £400,000 in £1 shares (250,000 ordinary and 150,000 preference). Return dated May 13th (filed June 10th). All shares taken up. £190,007 paid. £209,993 considered as paid. Mortgages and charges : Nil.

Central Sussex Electricity, Ltd.—Capital, £260,000 in £1 shares. Return dated May 12th. All shares taken up. £260,000 paid. Mortgages and charges : Nil.

Barlborough Electric Supply Co., Ltd.—Capital, £3,000 in £1 shares. Return dated June 18th. 2,967 shares taken up. £2,967 paid. Mortgages and charges : Nil.

Wandsworth Electrical Manufacturing Co., Ltd.—Capital, £25,000 in £1 shares. Return dated July 7th. 18,480 shares taken up. £15,615 paid. £2,865 considered as paid. Mortgages and charges : Nil.

London Electric Wire Co. and Smiths, Ltd.—Capital, £1,250,000 in £1 shares (750,000 ordinary and 500,000 preference). Return dated July 10th. 684,070 ordinary and 400,000 preference shares taken up. £350,035 paid. £734,035 considered as paid. Mortgages and charges : Nil.

Vactite Wire Co. (1919), Ltd.—Capital, £25,000 in £1 shares. Return dated July 10th. 15,000 shares taken up. £3 paid. £14,997 considered as paid. Mortgages and charges : £10,000.

Motor Rewinds & Repairs, Ltd.—Capital, £500 in £1 shares. Return dated July 22nd. All shares taken up. £500 paid. Mortgages and charges : Nil.

Mortgages and Charges

Page & Miles, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated September 19th, 1942, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

North-Eastern Electric Supply Co., Ltd.—Satisfaction to the further extent of £62,920 on September 17th, 1942, of trust deed dated December 30th, 1933, and registered January 17th, 1934, originally securing £2,500,000 3½ per cent. consolidated debenture stock.

Llanidloes Electric Light Co. (1926), Ltd.—Satisfaction to the extent of £300 on August 25th, 1942, of debentures authorised June 5th, 1936, and registered June 9th, 1936.

A. E. W. Ltd.—Satisfaction in full on December 31st, 1941, of debenture dated August 5th, 1938, and registered August 10th, 1938. (Notice filed September 25th, 1942.)

Bankruptcies

F. E. Roberts and **J. Savill,** electricians, lately carrying on business as the Commercial Light, Heat and Power Co., 47, Poland Street, London, W.1.—These debtors applied for their discharge at the London Bankruptcy Court on October 7th before Mr. Registrar Kean. The Official Receiver reported that they failed in November, 1940, with liabilities of £465; the assets had realised £234, and a dividend of 7s. 8d. in the £ had been paid. The partnership started in March, 1938, and the debtors attributed their failure to the outbreak of war. The Registrar granted each debtor his discharge subject to a suspension of three months.

J. A. Suttill, electrician, 34, Jesmond Road, Newcastle-on-Tyne. — First meeting to-day (October 16th) at the Official Receiver's Office, Gibb Chambers, Westgate Road, Newcastle-on-Tyne. Public examination, November 4th, at the Court House, 56, Westgate Road, Newcastle.

L. C. Rowse, radio and electrical dealer, 20, Western Place (formerly 60, Lower Market Street), Penryn, Cornwall.—Discharge suspended for a month as from September 11th.

STOCKS AND SHARES

TUESDAY EVENING.

THE amount of business which is being done in Stock Exchange markets shows expansion with almost every week. There can be no doubt that speculation is taking a hand in many of the markets,though the more serious part of the business, investment, is mainly responsible for the solid character of the improvement in prices. It seems tolerably obvious that, looking to the end of the war and after, investors are prepared to accept stocks and shares upon which, at the present rates of dividend, the yield on the money is no more than 4 per cent. For the time being, British Government securities are somewhat in the background though prices, on the whole, are well maintained. There is no present indication of money being diverted from gilt-edged securities into stocks and shares of what may be called lower character.

Home Railways Rise

One of the outstanding features in the many strong markets round the Stock Exchange is a spurt in Home Railway stocks. The sudden accession of public interest in this market, to which attention was drawn last week, has been carried further. Now and then, profit-taking became noticeable, the stock offered on these occasions being easily absorbed. Demand outstripped supply and, in the result, prices are again substantially higher on the week.

The inquiry extended to London Passenger Transport " C " which, after being a more or less moribund market for some time past, came to life under the genial influence of a little buying, causing the price to harden to 49. Southern Railway stocks were deemed to have lagged behind the rest and, being taken in hand, the preferred and the deferred stocks were sharply advanced. Metropolitan Railway assented stock rose 3 points to 52. Central London guaranteed assented stock is better at 76. There is a good deal of activity in the market. With the expansion in the volume of business, the jobbers in the stocks are able to make closer prices, thereby increasing the flexibility of dealing.

Home Electricity Supply

Northmet Power ordinary, with a florin rise to 35s., Metropolitans, with a gain of 1s. 6d. to 37s., and County of London ordinary, 1s. up, at 37s. 6d., have secured the principal gains in this department. Electrical Finance at 49s. and Yorkshires at £2 are a few pence to the good. Investors are discriminating between companies that will suffer more, and others not so much, by reason of the call for economy. Where an undertaking supplies factories, etc., engaged upon work of national consequence, it will be less affected, according to this argument, than another company whose main revenues are drawn from private consumers, shops and similar customers. But there has been no selling of any note in the shares of electricity supply companies of either class. As our price-lists reflect, the predominant factor is on the purchasing side.

Overseas

Speculation has come to life in stocks and shares in the Latin-American department. Brazilian Tractions provided the "star turn," with a jump of nearly a point, on declaration of an unexpectedly good dividend of 60 cents, making a dollar for the year. By way of contrast to the general strength of the market, Rio Tramways fives lost 2 points, at 98½. Mexican descriptions attract attention on account of the benevolent attitude which the United States is said to be adopting towards her southern neighbour's trade and commerce. Mexico Light & Power fives are up 2½, to 90. A boomlet in Argentine railway stocks has kept in step with the revival in Home Rails. The Argentine utility issues are, however, unchanged on the week. Anglo-Portuguese Telephones rose a further half-crown to 21s. 6d.; earlier this year the price went down to 12s. Indian electricity shares are again better; Calcutta at 28s. and Cawnpore at 26s. are both 1s. harder. Calcutta Tramways shares strengthened to 19s. Of the near East issues, Palestine and Jerusalem Electrics have gained 6d.

Dividend Effects

Declaration of a 10 per cent. dividend on Aron Electricity Meter ordinary shares has put up the price to 32s. 6d., a gain of 5s. 6d. in the last fortnight. The increase of 2½ per cent. came as a pleasant surprise, although for some weeks past expectation had toyed with the idea that there might be an improvement over the previous distribution. At the beginning of this year, the price of the shares was standing at about 23s., remaining almost stationary for six months. It was only recently that the improvement started which has raised the price to a level at which the yield on the shares comes to £6 3s. 1d. per cent. The only dividend disappointment of the week came from Electric & Musical Industries. Repetition of the previously paid 6 per cent. on these 10s. shares was well below anticipation, and a fall of 1s. lowered the price to 17s. 3d.

Equipment and Manufacturing

No pause has occurred in the advance of ordinary share prices. To the numerous rises recorded in last week's lists, a number of fresh improvements have to be added. The chief gain this week is 3s. 9d. in Consolidated Signal shares, raising the price to 77s. 6d. Westinghouse Brakes, their stable companion, came up $\frac{1}{16}$ to 51s. 3d. Enfield Cables

(*Continued on page* 508)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Oct. 13	Rise or Fall	Yield p.c.
Home Electricity Companies			£ s. d.		
Bournemouth and Poole	12½	12½	50/-	..	5 0 0
British Power and Light	6	6	27/-	+1/-	4 9 0
City of London	7	7	26/6	..	5 5 8
Clyde Valley	8	8	40/-	..	4 0 0
County of London	8	8	37/6	+1/-	4 5 4
Edmundson's:					
7% Pref.	7	7	33/6	..	4 3 7
Ord.	6	6	28/-	..	4 5 9
Elec. Dis. Yorkshire	9	9	42/-	..	4 5 9
Elec. Fin. and Securities	12½	12½	49/-	+6d.	5 2 1
Elec. Supply Corporation	10	10	44/-	—6d.	4 11 0
Isle of Thanet	2	Nil	12/-	..	—
Lancs. Light and Power	7½	7½	33/-	..	4 11 0
Llanelly Elec.	5½	5½	22/6	..	4 17 9
Lond. Assoc. Electric	4½	4	18/6	..	4 6 6
London Electric	6	6	23/6	..	5 2 1
London Power Red. Deb.	5	5	104½	..	4 15 7
Metropolitan E.S.	8	8	37/-	+1/6	4 6 6
Midland Counties	8	8	38/-	..	4 4 3
Mid. Elec. Power	9	9	41/-	..	4 7 9
Newcastle Elec.	7	7	30/-	..	4 13 5
North Eastern Elec. Ordinary	7	7	30/6	..	4 11 10
7% Pref.	7	7	33/6	..	4 3 7
Northampton	10	10	46/-	..	4 7 0
Notting Hill 6% Pref. (£10)	6	Nil	8¾	−¼	—
Northmet Power: Ordinary	7	7	35/-	+2/6	4 0 0
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	23/9	..	—
Scottish Power	8	8	38/-	..	4 4 3
Southern Areas	5	5	21/-	..	4 15 3
South London	7	7	24/6	..	—
West Devon	5	5	22/6	..	4 9 0
West Glos.	4½	3½	19/6	..	3 11 9
Yorkshire Elec.	8	8	40/-	+6d.	4 0 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/3	..	—
Calcutta Elec.	7*	7*	28/-	+1/-	5 0 0
Cawnpore Elec.	10	10	26/-	+1/-	7 13 10
East African Power	7	7	27/6	..	5 1 8
Jerusalem Elec.	7	5	19/-	+6d.	5 5 3
Kalgoorlie (10/-)	7½	5	7/-	..	7 2 10
Madras Elec.	6*	4*	17/6	..	4 11 4
Montreal Power	1½	1½	24	−½	6 5 0
Palestine Elec. "A"	Nil	4*	24/-	+6d.	3 6 8
Perak Hydro-elec.	6	7	6/6	..	—
Shawinigan Power	83cts.	90cts.	15¾	+¼	—
Tokyo Elec. 6%	6	6	14½	..	—
Victoria Falls Power	15	15	76/3	..	3 18 9
Whitehall Inv. Pref.	5	5	16/-	..	6 5 0

Company	Dividend Previous	Dividend Last	Middle Price Oct. 13	Rise or Fall	Yield p.c.
Public Boards			£ s. d.		
Central Electricity:					
1955–60	—	3	98⅝	..	3 0 10
1955–75	5	5	114	..	4 7 9
1951–73	4½	4½	107½	..	4 3 9
1963–93	3½	3½	103½	..	3 7 8
1974–94 *	3¼	3¼	99	..	3 5 4
London Elec. Trans. Ltd.	2½	2½	96	..	2 12 1
London & Home Counties 1955-75	4½	4½	109	..	4 2 7
Lond. Pass. Trans.: A	4½	4½	115½	..	3 18 0
B	5	5	114½	..	4 7 4
C	3	2⅞	49	+1	5 17 4
West Midlands J.E.A. 1948–68	5	5	108	..	4 12 7
Telegraph and Telephone					
Anglo-Am. Tel.: Pref.	6	6	110	..	5 9 1
Def.	1½	1½	26	..	5 15 5
Anglo-Portuguese	8	8	21/6	+¼	7 8 10
Cable & Wireless: 5½ Pref.	5½	5½	106½	+½	5 3 4
Ord.	4	4	68	+2	6 1 3
Canadian Marconi $1	Nil	4cts.	5/-	..	3 7 0
Globe Tel. & Tel.: Ord.	8½*	5*	29/6	+6d.	3 7 9
Pref.	6	6	28/-	..	4 5 9
Great Northern Tel.: (£10)	Nil	Nil	18	..	—
Inter. Tel. & Tel.	Nil	Nil	4	+½	—
Marconi-Marine	7½	7½	29/6	..	5 1 8
Oriental Tel. Ord.	16	10	52/6	..	3 16 2
Telephone Props.	6	Nil	12/-	..	—
Tele. Rentals (5/-)	10	10	10/-	+3d.	5 0 0
Traction and Transport					
Anglo Arg. Trans.: First Pref. (£5)	Nil	Nil	3/-	..	—
4% Inc.	Nil	Nil	8½	..	—
Brit. Elec. Traction: Def. Ord.	45	45	935	..	4 16 3
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8	10	46/3	..	4 6 6
Brazil Traction	8½	$1	17⅞	+⅛	—
Calcutta Trams	8	5½	19/-	+9d.	5 15 9
Cape Elec. Trams	5	5	22/6	..	4 9 0
Lancs Transport	10	10	43/9	..	4 11 4
Mexican Light: 1st Bonds	5	5	90½	+2½	5 11 1
Rio 5% Bonds	5	5	98½	−2	5 1 6
Southern Rly.: 5% Prefd.	5	5	71½	+1¼	6 19 10
5% Pref.	5	5	106½	+1	4 14 0
T. Tilling	10	10	49/-	+1/-	4 1 8
Tilling & B.A.	7*	6½*	57/6	..	2 5 3
West Riding	10	10	39/-	..	5 2 7

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Oct. 13	Rise or Fall	Yield p.c. £	s.	d.
Equipment and Manufacturing							
Aron Elec. Ord. ..	7½	10	30/–	..	6	13	4
Assoc. Elec.:							
Ord.	10	10	46/–	+6d.	4	7	0
Pref.	8	8	39/–	..	4	2	0
Automatic Tel.&El.	12½	12½	52/6	..	4	15	3
Babcock & Wilcox	11	11	47/3	+1/6	4	13	0
British Aluminium	10	10	47/9	+1/6	4	3	8
British Insul. Ord.	20	20	96/–	+1/–	1	3	4
British Thermostat (5/–)	18½	18½	16/3	..	5	13	10
British Vac. Cleaner (5/–)	10	15	17/6	..	4	5	9
Brush Ord. (5/–) ..	Nil	6	6/6	..	4	12	4
Callender's ..	15	15	74/–	+3d.	4	1	1
ChlorideElec.Storage	15	15	75/–	..	4	0	0
Cole, E. K. (5/–) ..	Nil	7	14/–	..	2	10	0
Consolidated Signal	17	17	77/6	+1/6	4	7	9
Crabtree (10/–) ..	17½	17½	33/6	+6d.	5	4	6
Crompton Parkinson Ord. (5/–) ..	30	20	24/–	+1/–	4	3	4
E.M.I. (10/–) ..	Nil	6	16/3	–1/–	3	13	10
Elec. Construction	10	10	34/6	..	5	16	0
Enfield Cable Ord.	12½	12½	54/6	+1/6	4	11	9
Elecl. Switchgear (10/–)	10	10	20/–	..	5	0	0
English Electric ..	10	10	42/–	..	4	15	3
Ensign Lamps (5/–)	25	25	16/3	..	7	13	10
Ericsson Tel. (5/–)	22*	20*	41/3	..	2	8	6
Ever Ready (5/–)	40	40	34/–	..	5	17	8
Falk Stadelmann	7½	7½	23/9	..	6	6	4
Ferranti Pref. ..	7	7	27/–	..	5	3	8
G.E.C.:							
Pref.	6½	6½	33/9	..	3	17	0
Ord.	20	17½	83/6	+1/–	4	3	9
Greenwood & Batley	15	15	33/–	..	9	1	10
Hall Telephone(10/–)	10	12½	21/3	+6d.	5	17	8
Henley's (5/–) ..	20	20	22/9	..	4	8	1
4½% Pref. ..	4½	4½	23/–	..	3	18	3
Hopkinsons ..	15	15	53/–	+6d.	5	14	5
India Rubber Pref.	5½	5½	20/–	..	5	10	0
Intl. Combustion..	32½	30	112/6	..	5	6	9
Johnson & Phillips	15	15	65/–	..	4	12	4
Lancashire Dynamo	20	20	73/9	..	5	8	4
Laurence,Scott(5/–)	15	12½	9/6	..	6	11	7
London Elec. Wire	7½	7½	29/–	+9d.	5	3	5
Lucas, J.	15	15	71/3	+1/6	4	4	4
Mather & Platt ..	10	10	43/9	+1/6	4	11	4
Met.Elec.Cable Pref.	5½	5½	21/3	..	5	3	6
Murex	20	20	97/6xd..		4	2	0
Pye Deferred (5/–)	25	25	17/6xd	–6d.	7	2	10
Revo (10/–) ..	20	17½	32/6	+1/6	5	7	8
Reyrolle	12½	12½	61/3	..	4	1	7
Siemens Ord. ..	7½	7½	26/6	..	5	13	3
Smith, S. (1/–) ..	50	37½	7/9	..	4	18	6
Strand Elec. (5/–)	2	4	4/9	..	4	4	3
Switchgear & Cowans (5/–) ..	15	10	10/–	..	5	0	0
T.C.C. (10/–) ..	5	5	15/–	..	3	6	8
T.C. & M.. ..	10	10	44/–	..	4	11	0
Telephone Mfg.(5/–)	9	9	10/–	..	4	10	0
Thorn Elec. (5/–)..	20	20	17/–	+6d.	5	17	8
Tube Investments	23½	20	88/6	+6d.	4	10	6
Vactric (5/–) ..	Nil	Nil	8/9	+6d.		—	
Vickers (10/–) ..	10	10	18/3	..	5	9	7
Ward & Goldstone (5/–)	20	20	20/–	..	5	0	0
Westinghouse Brake	10	10	51/3	+1/6	3	18	2
Walsall Conduits(4/–)	55	55	38/9	..	5	13	4
West, Allen (5/–)..	7½	7½	5/9	..	6	10	5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 506)

responded to a comparatively modest demand with a gain of 1s. 6d., to 54s. 6d. Rolling Mills are better at 15s. British Aluminium, Joseph Lucas, and Mather & Platt show rises of 1/16. Revo advanced to 32s. 6d., London Electric Wire put on 9d., Crabtrees, Hopkinsons, Thorns and Hall Telephone, 6d. each. British Insulated, General Electrics and Crompton Parkinsons are 1s. up in each case. Callender's hardened to 74s.; Vactrics to 8s. 9d. Midland Electric Manufacturing at 5 7/8 are 1/8 better. The "heavy" group has moved on similar lines. Vickers are 1s. higher at 18s. 3d., and Babcock & Wilcox 1/16 at 47s. 3d.

"No Stock"

Nor does this catalogue of rises tell the whole story. To complete it, the paragraph must add the admission that the prices are in too many instances nominal from the point of would-be buyers. Shares are easy enough to sell, and at good prices, but the prospective buyer finds, only too often, that his orders to purchase cannot be executed because there is no supply available. The jobbers in the market, unless they have stock on their books, or know where to go for it, decline to sell when they see little prospect of being able to carry through the transaction within a reasonable time. "We can't make shares" is a common retort by the broker to the impatient client.

Cable & Wireless

The recovery in the prices of Cable & Wireless preference and ordinary stocks has been continued under the pressure of speculative investment demand for the ordinary, the preference being regarded as a good investment mixer to put with similar stocks on which the return is less. That the rise in the ordinary has not come sooner, is a matter for surprise to purchasers convinced that the stock is worth, at any rate, 70. Absorption of the ordinary stock by the average investor has hitherto been met by liberal supplies. Of late, however, the buying has been better than the selling, as the Stock Exchange says, with the result that the ordinary stock is 2 higher at 68. The preference at 106½ has gained the fraction.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1940

16283. "Lighting units or projectors." I. M. Heald and E. Windsor-Bowen. November 9th, 1940. (547906.)

17751. "Apparatus for X-ray serial radiography." General Electric Co., Ltd., and J. T. Caldwell. December 16th, 1940. (547943.)

17752. "Casettes for photographic plates or films." General Electric Co., Ltd., and J. T. Caldwell. December 16th, 1940. (547944.)

1941

1811. "Electron-discharge devices." F. J. G. Van Den Bosch, E. T. J. Tapp and Vacuum-Science Products, Ltd. February 10th, 1941. (547945.)

3384. "Absorption refrigerating apparatus," N. E. Af. Kleen. February 27th, 1940. (547978.)

3396. "Change-over electric switches." A. Abbey. (Wilson Welder & Metals Co., Inc.). March 12th, 1941. (547856.)

3409. "Electric distribution systems and multi-winding transformers therefor." British Thomson-Houston Co., Ltd. March 14th, 1940. (547857.)

3441. "Electrical oscillation generators and time bases." Marconi's Wireless Telegraph Co., Ltd., and N. L. Yates-Fish. March 13th, 1941. (547949.)

3444. "Amplifier circuit arrangements." Marconi's Wireless Telegraph Co., Ltd., and T. H. Price. March 13th, 1941. (547890.)

3489. "Control units, particularly adapted for radio tuning apparatus." Standard Telephones & Cables, Ltd., and H. Bullas. March 14th, 1941. (547896.)

3493. "Magnetic control vacuum tubes." Standard Telephones & Cables, Ltd. March 20th, 1940. (547979.)

3642. "Electric fuses." G. Pailin, S. Farrer and Ferguson Pailin, Ltd. March 17th, 1941. (547903.)

3716. "Temperature measurement or control of electrically heated salt baths and the like." J. E. Oram and Wild-Barfield Electric Furnaces, Ltd. March 18th, 1941. (547983.)

5305. "Apparatus for supplying electric current to low-voltage appliances." E. Mestitz and Elco (Treforest), Ltd. April 24th, 1941. (547920.)

5719. "Sound-absorbing apparatus." Standard Telephones & Cables, Ltd. July 17th, 1940. (547922.)

6743. "Methods of permanently sealing steel-tank mercury arc rectifiers." British Thomson-Houston Co., Ltd., and F. P. Whitaker. May 26th, 1941. (547929.)

6759. "Centrifugal switches." Heenan & Froude, Ltd., and G. H. Walker. May 27th, 1941. (Addition to 544235.) (547964.)

6803. "Fluid-pressure-operated servomotors for operating electrical switches." C. H. Flurscheim and Metropolitan-Vickers Electrical Co., Ltd. May 27th, 1941. (547930.)

6820. "Electromagnetic thickness gauges." British Thomson-Houston Co., Ltd. May 28th, 1940. (547958.)

7391. "Means for compensating the inductive idle or wattless load of a consumer's installation." Landis & Gyr Soc. Anon. June 14th, 1940. (547933.)

7507. "Distance protective arrangements for electric systems." British Thomson-Houston Co., Ltd. June 14th, 1940. (547861.)

7876. "Electrical precipitation plant for the treatment of gases." Whessoe Foundry & Engineering Co., Ltd., and K. W. Francombe. June 23rd, 1941. (547862.)

8049. "Protection of polyphase electrical apparatus." J. M. Gillespie and Metropolitan-Vickers Electrical Co., Ltd. June 26th, 1941. (547863.)

8548. "Flexible drives, particularly for Diesel mechanical, Diesel-electric and electric locomotives and the like." H. J. Hammersley. July 7th, 1941. (547938.)

8712. "Holders for thermionic valves and other electrical devices." Carr Fastener Co., Ltd., and G. Wagstaff. July 10th, 1941. (547968.)

8908. "Holders for electric lamp caps of the screw type." British Thomson-Houston Co., Ltd., F. Widnall and F. W. Thorpe. July 14th, 1941. (547941.)

10218. "Polarised moving-iron indicating or measuring instruments." Ferranti, Ltd., and H. Easton. August 12th, 1941. (547990.)

10228. "Apparatus for the detection of cracks in ferrous metals by magnetic means." L. Johnson. August 12th, 1941. (Cognate application, 14985/41.) (547991.)

10409. "Electric liquid-heating devices." R. Haddan (Moffats, Ltd.). August 15th, 1941. (547865.)

12062. "Magnetic focusing arrangements for cathode-ray tubes." Standard Telephones & Cables, Ltd. September 28th, 1940. (547998.)

14066. "Kinematograph projectors." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). October 31st, 1941. (548003.)

14841. "Method of washing anodes." C. E. Every. (Hudson Bay Mining & Smelting Co., Ltd.). November 18th, 1941. (548006.)

16240. "Electrodeposition of tin-zinc alloys." V. A. Lowinger, R. M. Angles and S. W. Baier. December 16th, 1941. (548009.).

1942

1933. "Electron-discharge devices." F. J. G. Van Den Bosch, E. T. J. Tapp, and Vacuum-Science Products, Ltd. February 10th, 1941. (Divided out of 547945.) (547971.)

Argentine Telecommunication Standards

THE *Revista Electrotechnica*, of Buenos Aires, reports that a special Telecommunication Committee has recently been appointed by the Argentine Institute of Material Rationalisation to draw up a series of standards for telecommunication material and apparatus for use in Argentina.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Aberdeen. — October 21st. Corporation. Materials, including electrical fittings. Specification from City Engineer's Office; tenders to Mr. T. F. Henderson, city and water engineer.

Australia.—QUEENSLAND. — November 19th. 22-kV and 66-kV switchgear (Contract 42/J) and 1-kV and 6·6-kV lead-covered cable (Contract 42/K); A. E. Wilkinson, clerk to the Barron Falls Hydro-electric Board, Cairns.

NEW SOUTH WALES.—Sydney County Council. November 26th. Current-limiting reactors for Bunnerong. Specification 594.

Dewsbury.—October 28th. Town Council. Lamps and cables. (October 9th.)

Orders Placed

Australia. — MELBOURNE. — City Council. Accepted. V.i.r. cable.—W. T. Henley's Telegraph Works Co., Ltd. (£1,261); Johnson & Phillips, Ltd. (£1,250); Noyes Bros. (Melb.), Ltd. (£1,304); Gilbert Lodge & Co., Pty., Ltd. (£2,810).

Insulating material.—British General Electric Co., Pty., Ltd. (£279); Dunlop Rubber Australia, Ltd. (£333); Mica & Insulating Supplies Co. (£1,108); A. H. Gibson (Electrical) Co., Pty., Ltd. (£333).

Electric lamps.—Ensign Lamps (Aust.), Pty., Ltd. (£1,288); Australia General Electric, Pty., Ltd. (£721); Condor Lamps Australia, Ltd. (£719); Lawrence & Hansen Elecl., Pty., Ltd. (£719).

Steel conduits.—Siemens (Aust.), Pty., Ltd. (£114); W. G. Watson & Co., Pty., Ltd. (£501).

Birkenhead. — Assistance Committee. Accepted. Electric truck (£130).—Dairy Equipment Co., Ltd.

Eccles.—Electricity Committee. Accepted. Four e.h.v. switchgear units (£802) and alterations to e.h.v. switchgear (£612).—Metropolitan-Vickers.

Huddersfield.—Electricity Department. Accepted. Battery board.—Metropolitan-Vickers Electrical Co., Ltd. Charging equipment.—Tudor Accumulator Co., Ltd.

H.v. paper/cambric cables for three years.—B.I. Cables; Callender's; Siemens Electric Lamps & Supplies.

Salford.—Recommended. Three-phase oil-immersed transformers for twelve months.—Bryce, Ltd. Switch unit (£245).—General Electric Co., Ltd.

Stretford. — Parks Committee. Accepted. Electricity installation at Edge House Farm (£34).—Stretford & District Electricity Board.

Watford.—Electricity Committee. Accepted. 150-kVA transformer (£178).—Brush Electrical Engineering Co., Ltd. Switchboard (£1,183).—General Electric Co., Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birkenhead.—Food stores; borough engineer. Rebuilding hall, Vincent Street; Salvation Army.

Croydon.—Reconstruction of "B" block at the Isolation Hospital (£2,173); E. H. Smith (Croydon), Ltd., builders, 48, Wellesley Road.

Derbyshire.—Extensions to schools at Sutton-cum-Duckmanton, Chesterfield; J. Harrison, county architect, County Offices, Derby.

Gateshead-on-Tyne.—Canteen, Team Valley Trading Estate; H. Hill, 10, Winchester Street, South Shields.

Hazel Grove.—Fire station, Argyle Street; J. F. Andrews, surveyor, Council House.

Hertfordshire.—Southern wing of proposed Church Hill Road school (£7,000), Clerk's Department, Castle Street, Hertford.

Liverpool.—Extensions, operating theatre, for Borough Hospitals Committee; L. H. Keay, city architect, Blackburn Chambers, Dale Street.

London.—Water supply improvements (£10,000); Metropolitan Water Board.

Motherwell.—Workers' canteen for Atlantic Engine Co. (1920), Ltd., Wishaw.

Newcastle-on-Tyne.—Wartime nursery at Delaval House for the City Council (£2,000); W. Hall (Contractors), Ltd., Derwentwater Road, Gateshead.

Engine house; Newcombe & Newcombe, Eldon Square.

Northumberland.—A.R.P. report centre, Wallsend; county architect, Mitford Road, Morpeth.

Oxford.—Erection of county control centre; county architect.

Kitchen, and provision of equipment, City of Oxford High School (£1,340); borough engineer, Municipal Buildings.

Peebles.—Reconstruction of Empire Cinema after fire; manager.

Sheffield.—Adaptation of Sydcope Hall as Fir Vale institution annexe (£1,810); city engineer.

Erection of a church, Arbourthorne Estate; secretary, Diocesan Board of Finance, 1, St. James' Street, Sheffield, 1.

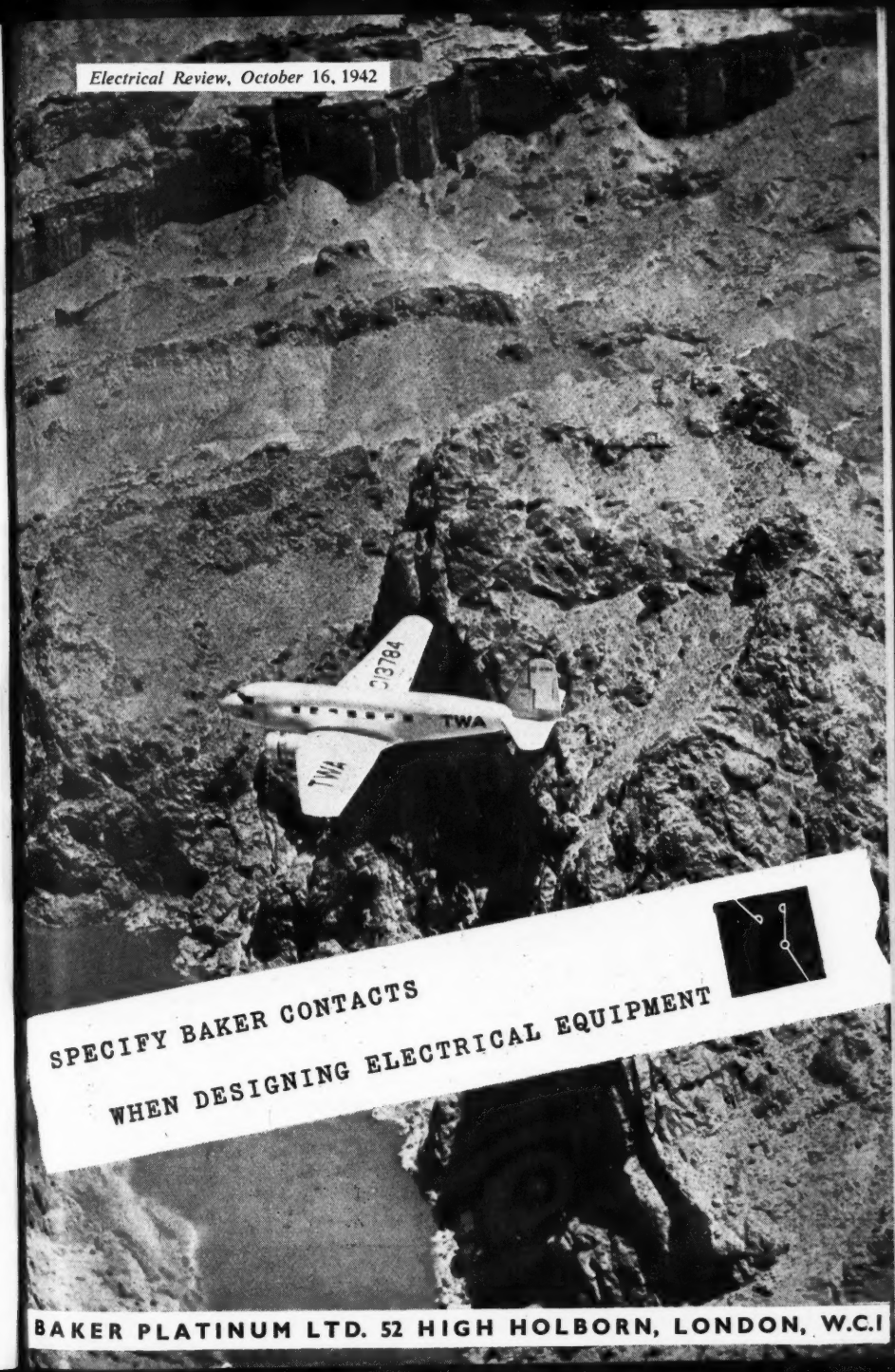
Southport.—Additions, New Hall Hospital (£2,352).—Northern Steel Scaffolds, Ltd.

Stirlingshire.—Cleansing station, Falkirk (£1,250); county architect, Stirling.

Sunderland.—Fitting shop for boat building company; T. D. Gibbon & Son, Hendon Burn Avenue.

Alterations, cabinet works; Matkin & Hawkins, Barclays Bank Chambers.

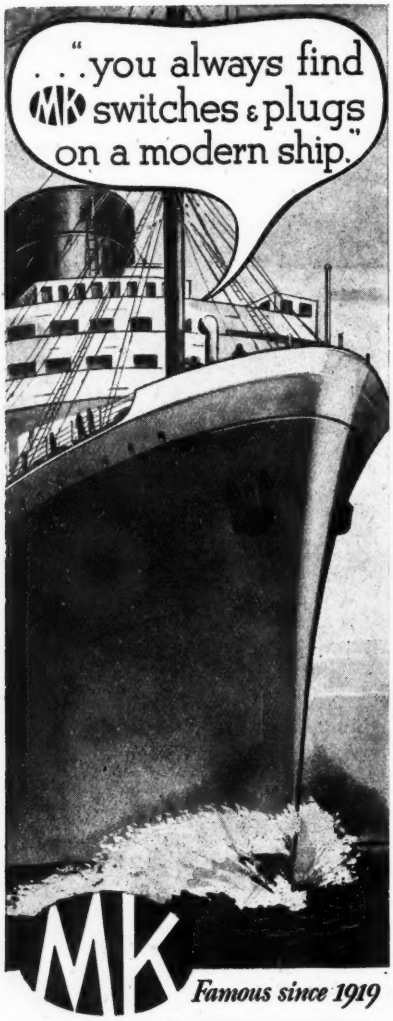
Air-raid shelters, stores and substation for J. L. Thompson & Sons; G. T. Brown, Fawcett Street.



SPECIFY BAKER CONTACTS

WHEN DESIGNING ELECTRICAL EQUIPMENT

BAKER PLATINUM LTD. 52 HIGH HOLBORN, LONDON, W.C.I



MK *Famous since 1919*

PLUGS & SOCKETS, SWITCHES, SWITCH SOCKETS, COOKER CONTROL UNITS, ETC.

M.K. ELECTRIC LIMITED
EDMONTON, N.18

M.K. 156a.

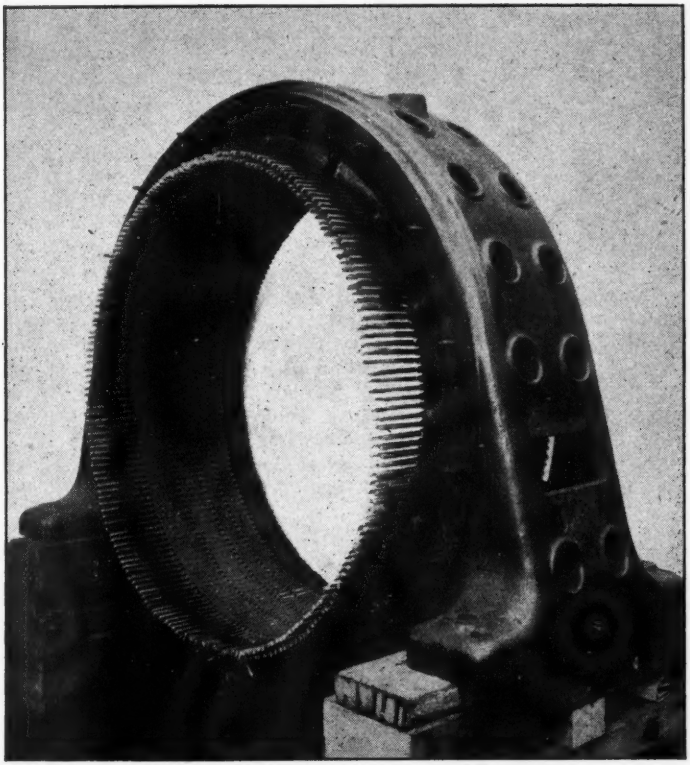
Victory First!

'Austerity' is the watchword for the peoples of the United Nations. In sacrificing luxuries and even former necessities we enable our resources to be more rapidly mobilised for the defeat of the Axis powers. When the better things of life once more become available those most entitled to their enjoyment are the millions now fighting and toiling for Victory!

A Tribute to the War-Workers of the Nation.

ELEXCEL LTD. LONDON & LIVERPOOL

Makers of XCEL *Electric Cookers*



REWINDING A LARGE STATOR AT OUR WORKS

For reliable and guaranteed repairs or rewinds you cannot do better than get in touch with us.

WE COLLECT AND DELIVER

Electrical Power Repairs (Gillingham) Ltd.

STROVER STREET, GILLINGHAM, KENT

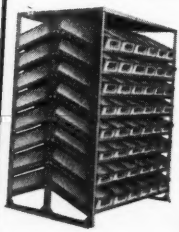
Telephone No.: Gillingham 5200

AUSTIN WALTERS & SON LTD.

MANUFACTURERS OF

STORAGE EQUIPMENT

Bins and Shelving
single and double-sided



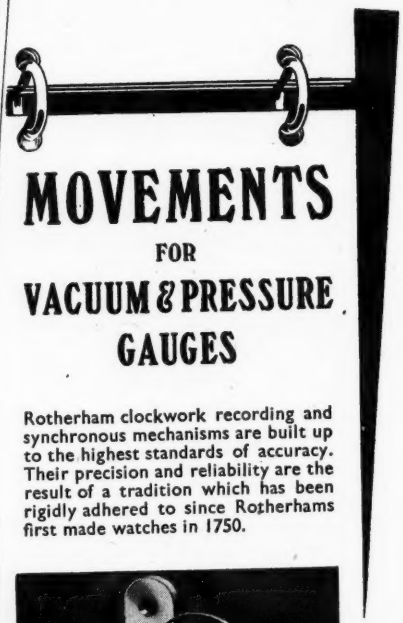
STORAGE RACKS
for
Small Parts
Removable Trays

TOOL CABINETS
39" × 18" × 15"
Lock and Key

FROM STOCK

STEEL WORK BENCHES
8' 0" × 3' 0" × 2' 8"
Two Drawers with Lock and Key

AUSTIN WALTERS & SON LTD.
Old Trafford. MANCHESTER 16

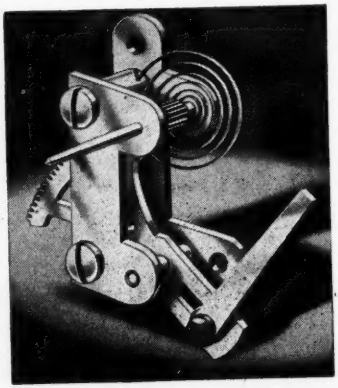


MOVEMENTS

FOR

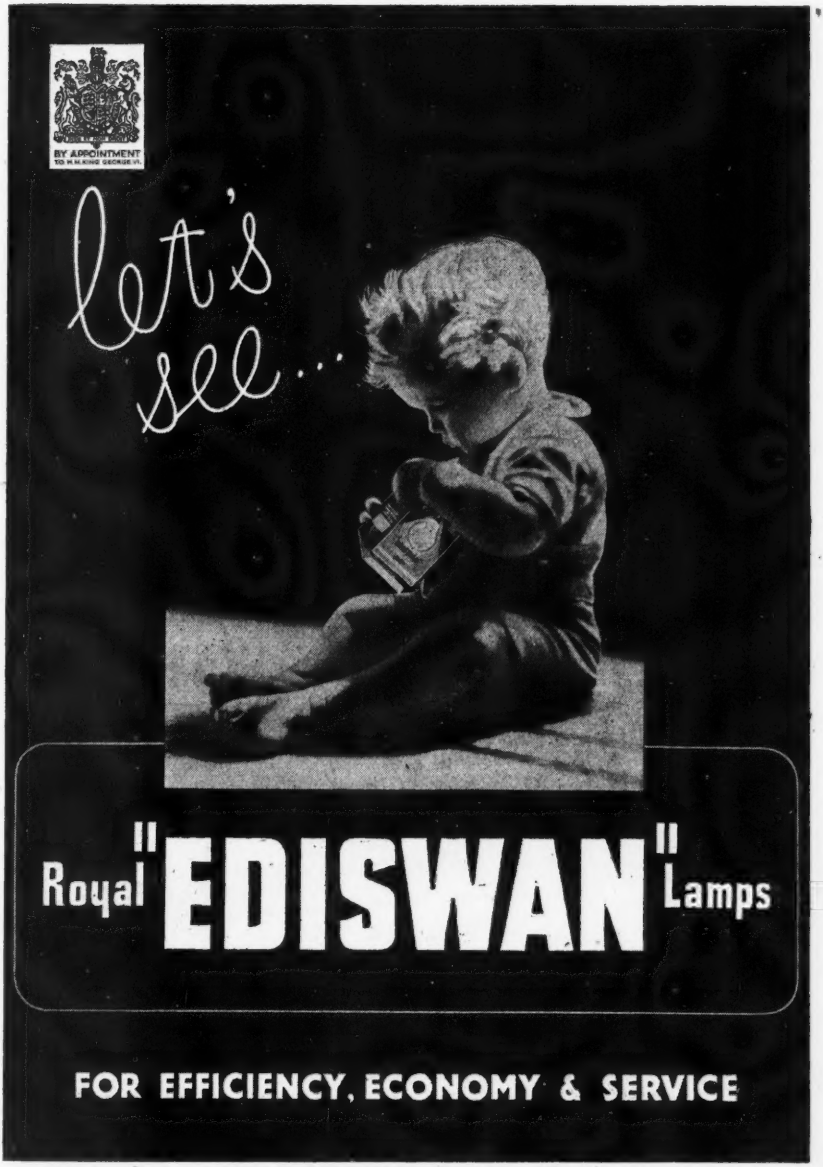
VACUUM & PRESSURE GAUGES

Rotherham clockwork recording and synchronous mechanisms are built up to the highest standards of accuracy. Their precision and reliability are the result of a tradition which has been rigidly adhered to since Rotherhams first made watches in 1750.



Rotherhams OF COVENTRY

ROTHERHAM & SONS LTD
COVENTRY. Tele.: 4154
PRECISION MANUFACTURERS SINCE 1750



Advertisement of THE EDISON SWAN ELECTRIC CO., LTD., 155 Charing Cross Road, London, W.C.2

D

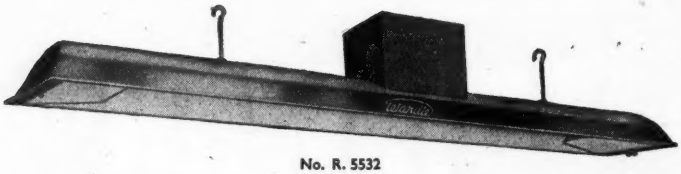
Resistance wires

all Ex-Stock

Insulating Beads

Lionel Robinson
& Co. Ltd.
3 Staple Inn
London, W.C.1
Telephone - - HOLborn 6322

WARDLE "TRAFFORD" REFLECTORS

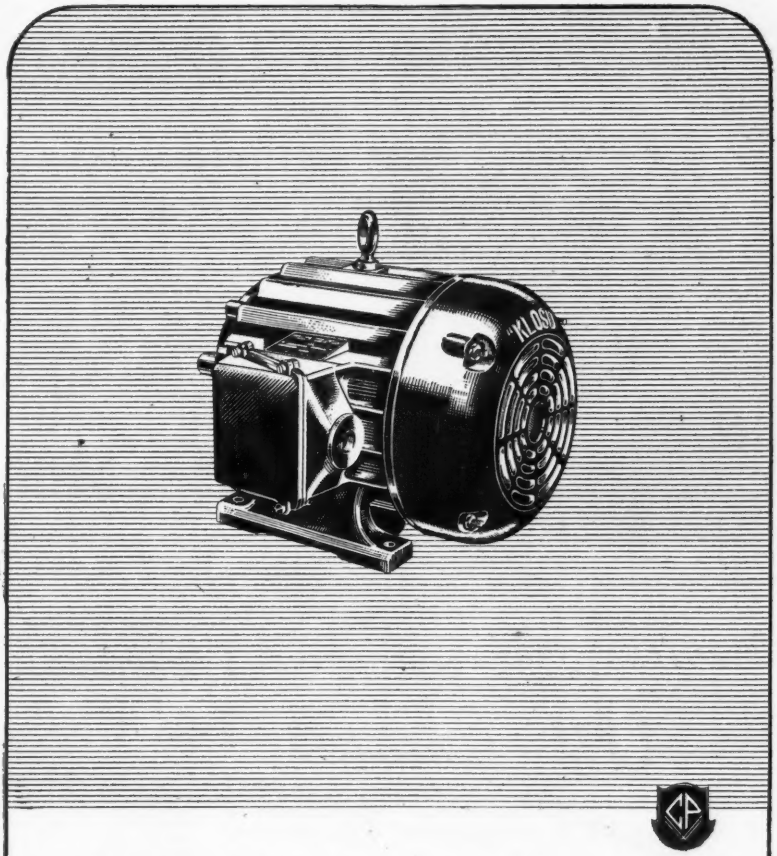


No. R. 5532

For use with 80-watt, 5-ft. Fluorescent Tubes.
Heavy gauge sheet steel. Standard finish, glossy enamel.
Chain or tube suspension. With or without gear box.

Write for Publication No. R. 588.

WARDLE ENGINEERING CO. LTD.
OLD TRAFFORD, MANCHESTER, 16
London - 34 VICTORIA STREET, S.W.1



Cool and Protected. *Fin and fan combine to give the maximum cooling with complete dirt and damp protection in the Parkinson "Klosd" Motor . . .*

CROMPTON PARKINSON
Limited

D*

SCOTT OF BELFAST

IN THE HEART OF EVERY INDUSTRY . . . YOU WILL FIND SCOTT MOTORS PLAYING THEIR VITAL PART—supplying maximum power with continuous service under all conditions — so essential to present-day demands.

Every size from ¼ H.P.—250 B.H.P. conforms to the same standard of reliability produced by over 40 years' specialisation.

We are now in a position to despatch ex stock 3-phase squirrel-cage motors up to 25 b.h.p.

Scott motors

HUGH J. SCOTT & CO. (BELFAST) LTD., VOLT WORKS, RAVENSHILL ROAD BELFAST, NORTHERN IRELAND

PYROTENAX POINTS No. 2.

Oil-resistant—

AN IMPORTANT QUALITY ESPECIALLY FOR SHIPPING & FACTORY INSTALLATIONS

The copper sheath and mineral insulation of Pyrotenax Cables are entirely unaffected by oil; moreover, special oil-resisting seals are used to ensure that no oil can possibly percolate into the joints where it might carbonise in the event of fires and thus interfere with its fire-resisting properties. This is only one of many features which cause Pyrotenax Cables to be used in ever-increasing quantities.

FIRE-RESISTANT • OIL-RESISTANT • FLEXIBLE • WITHSTANDS MALTREATMENT • MOISTURE AND CONDENSATION PROOF • NON-AGEING • NEAT IN APPEARANCE.

PYROTENAX
WITHSTANDS FIRE AND INJURY

Mineral Insulated Copper Covered CABLES

PYROTENAX LTD. HEBBURN CO. DURHAM

Motor wiring on Hopkinson Oil Centrifuge. This is an excellent application of the cable's resistance to oil, with which it is in continual contact

IGRANIC
Electric Control Gear

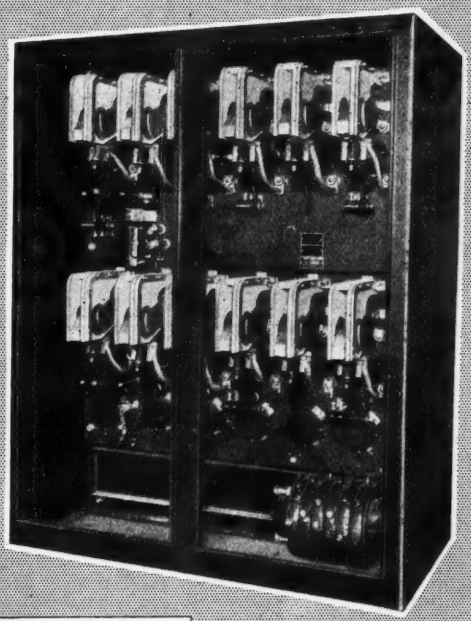


Illustration shows Igranic Panel for Control of 25-Ton High-Speed Main Hoist Dogging Crane

BEDFORD
IGRANIC
ELECTRIC Co LTD
LONDON

For
EFFICIENT PROTECTION
of Valuable Machinery and for
RELIABILITY specify
IGRANIC CONTROL
A TYPE FOR EVERY DUTY AND SERVICE

Save time, labour and space in the drawing office

'STATFILE'

1. **Saves tracing.** No need to check. No possibility of errors.
2. **Saves space.** Neither original drawings nor tracings need be stored; only the negatives need be kept and 50 of these occupy 1" of drawer space.
3. **Improves legibility.**
4. **Secures records.** Negatives can be stored in safety.
5. **Facilitates transport.** You send negatives, not drawings.

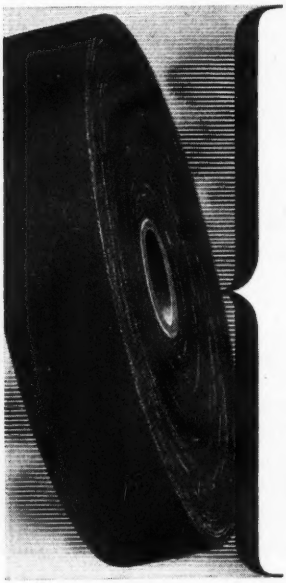
Full details from :

PHOTOSTAT LIMITED

Dept. I, Adelaide House
King William Street, London, E.C.4

Sole manufacturer of 'Photostat' materials : KODAK LTD.

"Statfile" is a registered trade mark of Photostat Ltd.



CONNOLLY'S

Adhesive Tape

Available in two grades—"Blackley" Adhesive Tape for the very best work where only the best will do. A really super tape. "Limpet" Adhesive Tape for the next best job where a high degree of quality is required but where price is an important consideration. One or other of these famous Adhesive Tapes will completely fill your requirements. "Blackley" or "Limpet" on every job.

CONNOLLY'S (BLACKLEY) LTD., MANCHESTER 9

Telephone : Cheetham Hill 1801 (3 lines)
Telegrams : "Connollys, Blackley."
London Office : **OSWALDESTRE HOUSE, STRAND, W.C.2**
Telephone : TEMple Bar 5506-7
Telegrams : "Syllennoc, Estrand, London."

MOTORS

OF
DEPENDABILITY
UNDER
ARDUOUS CONDITIONS
ASSURED BY
ATTENTION TO DETAIL AT
EVERY STAGE OF
MANUFACTURE

GENERATORS
SWITCH & CONTROL GEAR
TRANSFORMERS
MERCURY-ARC
AND
METAL-PLATE
RECTIFIERS
bearing the mark

E.C.C

have that quality upon which our name has built a reputation

Totally Enclosed Air-blast
"Blow-over" type
Squirrel-cage Motor
As supplied in medium sizes

III

THE
ELECTRIC CONSTRUCTION
CO. LTD.
WOLVERHAMPTON
Telephone 21455

282

When licences are a thing of the past

Merchants and manufacturers will find available to them the unrestricted range of non-ferrous metals and alloys of

I.C.I. METALS

Meanwhile these materials are well worth remembering for the work of the future.

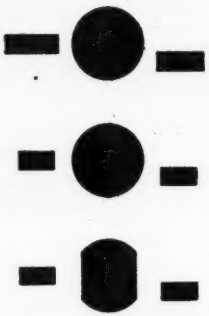
I.C.I. METALS LTD., BIRMINGHAM

This is the System that Wylex Built

3 SOCKETS
15 amp. 5 amp. and 2 amp.

3 PLUG TOPS
15 amp. which will take the 5 or 2 amp. Fused Plugs.

The Apertures in Sockets and the Plug Pins vary in width.



THEREFORE small plugs go into LARGER SOCKETS while larger Plugs will not go into SMALLER SOCKETS.

This gives exceptional convenience.

Can only be done with the Flat Pin Wylex Fuse Plug System.

MILLIONS IN USE

WYLEX

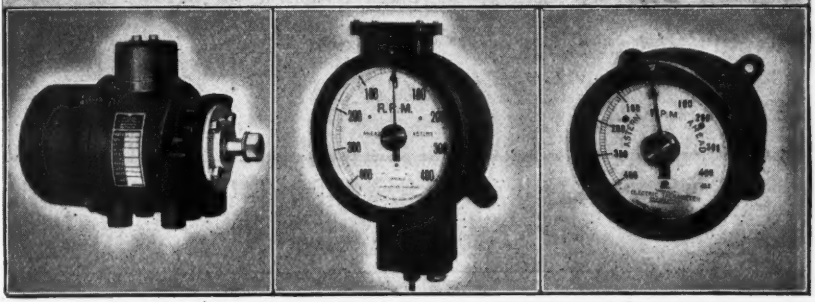
GEORGE H. SCHOLES & Co. Ltd.
Wylex Works, Wythenshawe, MANCHESTER.

N5

ROBUST ACCURATE & RELIABLE

RECORD

'CIRSCALE' Electric type TACHOMETERS



D.C. GENERATOR TRANSMITTER made in two types. Industrial and Watertight as required. Two or more indicators can be operated from the one Transmitter.

MARINE PATTERN INDICATOR in Admiralty bronze watertight case with terminal box and fixing lugs. Illuminated dial also supplied, for use on the bridge of a ship.

MARINE PATTERN INDICATOR in dust and splash proof case, for wall or panel mounting. Illustration shows centre zero instrument for use as combined directional and speed indicator.

THE RECORD ELECTRICAL COMPANY LTD.

BROADHEATH · ALTRINCHAM · CHESHIRE.

LONDON OFFICE:- 28, VICTORIA STREET, WESTMINSTER, S.W.1.

Telegrams: "Patella, Sedist, London." Telephone: Hop 0594 (3 lines).

CABLE

V.I.R. Braided, Lead Covered, T.R. Sheathed CABLES, STARTERS, SWITCHGEAR, "RAPPER" Tools, "QUEAD" Dimmers.

ALL MANUFACTURED BY US IN LONDON

WILLIAM GEIPEL LTD. Head Office: 156-170 Bermondsey Street, LONDON, S.E.1
Cable Works: WEMBLEY, MIDDLESEX.

SANDERS
WEDNESBURY

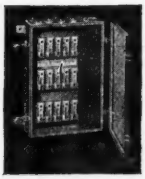
Manufacturers of

SUPERIOR SWITCH & FUSE GEAR

A RANGE AVAILABLE FOR EVERY PURPOSE

SUPER-SANDASPEED FUSEBOARDS.

Complies B.S.214. Heavy industrial duty.
Light robust rigid steel case. Weatherproof.
Detachable conduit plates per way or sealing chamber. 30 to 200 amps. 500 volts.
Double Pole, Triple Pole, and Triple Pole & Neutral. Alternative carriers for H.R.C. and ordinary duty.



LONDON OFFICE:
78 NEAL ST. W.C.2.
Phone TEMPLE BAR 8984

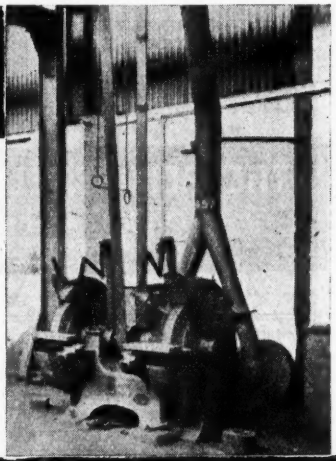
WM SANDERS & CO. (WEDNESBURY) LTD.
RIDDING LANE WEDNESBURY STAFFS.
'PHONE, WEDNESBURY 0595-6-7 'GRAMS, SANDERS, WEDNESBURY.

DUST is Production Enemy No.1!

INCREASED production means greater activity of machinery, with a corresponding increase in the quantity of dust during the manufacture of products. This dust must be removed or production will be seriously affected. Accumulations of dust clog machinery and retard efficient working, and are a menace to the health of workers.

In industries where metals are ground, finished, and polished, and where castings are cleaned, considerable quantities of dust and sand arise. Efficient Dust Removal Plant is therefore a direct necessity to control this nuisance. If the dust removal arrangements in YOUR factory appear unsatisfactory, consider now the advantages of "Sirocco" Plant, which is offering outstanding service in numerous industries in all parts of the world.

Our illustration shows "Sirocco" Plant servicing a Grinding Shop. Further examples of industrial application are contained in Catalogue SF300, available on request.



DUSTY JOBS NEED "SIROCCO" PLANT

DAVIDSON & CO., LTD.
Sirocco Engineering Works, BELFAST.
LONDON, MANCHESTER, LEEDS, BIRMINGHAM, NEWCASTLE, GLASGOW, CARDIFF, DUBLIN.

ESTD. SIROCCO 1881

HIGH GRADE ACCESSORIES

including complete range of :—

HOLDERS
CEILING ROSES
and
PLUG CONNECTORS

to B.S. Specifications.

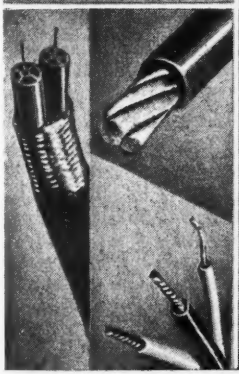
Prompt delivery if for essential service.

A.I.D. Fully Approved.

WARD & GOLDSTONE LTD PENDLETON MANCHESTER 6.

TENAPLAS
EXTRUDED PLASTICS
TRADE MARK

TENAPLAS
Extruded Plastics

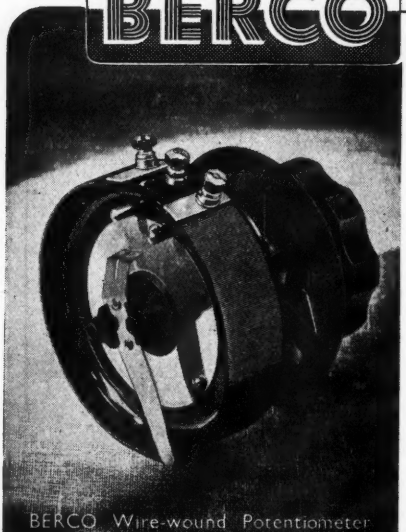


THE Tenaplas Process of Extrusion permits the use of plastics for covering a variety of materials, including wire, rope, etc. If you believe your products will benefit by this process we shall be pleased to advise you.

TENAPLAS LTD.

Head Office : **7 PARK LANE, LONDON, W.1**

BERCO



BERCO Wire-wound Potentiometer

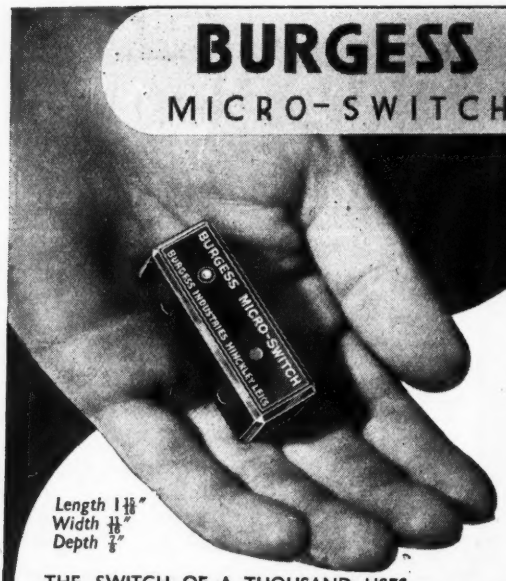
RESISTANCES

Although present circumstances render it difficult for us to give our pre-war service to all customers we are still working in their interests.

New materials and manufacturing processes which we are now using to increase output also contribute in large measure to improved performance and reliability of our products. Thus, when normal times return, all users of Berco Resistances will benefit by our work to-day.

THE BRITISH ELECTRIC RESISTANCE CO. LTD.
QUEENSWAY, PONDERS END, MIDDLESEX
Telephone : HOWARD 1492.
Telegrams : "VITROHM, ENFIELD."
R.I.

BURGESS
MICRO-SWITCH



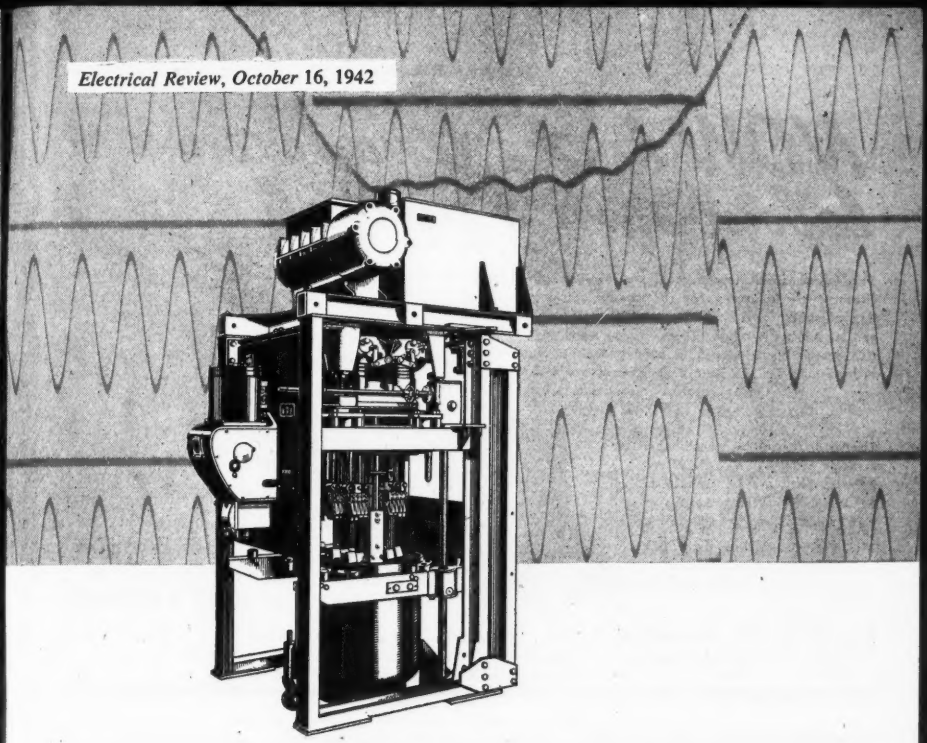
Length $1\frac{15}{16}$"
Width $\frac{11}{16}$"
Depth $\frac{7}{8}$"

THE SWITCH OF A THOUSAND USES

See how small the Burgess Micro-Switch is compared with the hand holding it! Just think of the thousands of uses it can be put to. Operating pressure 14 ozs. Pressure differential 4 ozs. Movement differential 1/1000 inch only. Rated capacity 5 amps. at 250 volts A.C. An ounce in weight it can be installed in any position. Positive snap action with no neutral position. Switch can be operated up to 60 times a minute, at full rated capacity. Practically impossible to damage by ordinary usage. Ideal for practically all automatic switching applications.

★*Write for B.P.806/E.R. illustrating all types of switches available.*

BURGESS PRODUCTS CO. LTD.
HINCKLEY *Phone :*
Leics. *Hinckley 700 (3 lines)*
London : 72 Horseferry Road, S.W.1
Phone : Abbey 1868
Scottish Representatives :
R. McCartney & Co., 142 Queen St. Glasgow, C.1



***Testing time** with Crompton Switchgear is at all stages of development. Crompton station testing gives certainty of the rated performance and of dependable operation.*

CROMPTON PARKINSON
Limited

NOW is the time to consider labour-saving ideas!

This Portable Belt Loader is saving valuable man-power in almost every industry. For the loading, stacking or handling of almost any kind of materials it is reducing time and labour to a fraction. There may be many ways in which this practical machine could save you time, trouble and man-power. Tell us your problems and we will send you the appropriate information.

The Parker Portable Belt Loaders are available with 14", 16", 18" 20" and 24" wide Belts, and are from 25' to 60' long, with discharge heights of 9' 6" to 24' (fixed or adjustable).

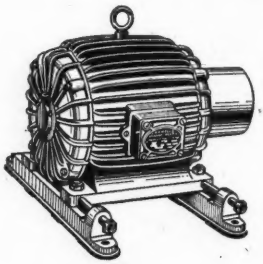
We also manufacture fixed Belt Conveyors for any length.

THE PARKER PORTABLE BELT LOADERS

FREDERICK PARKER LTD., Catherine Street (Extension 19), LEICESTER
Telephone: Leicester **61273** (4 lines). London Office: 3/19 Talbot House, Arundel Street, W.C.2
Telephone: **4239** and **2739** Temple Bar, London.

HOWELLS (ELECTRIC MOTORS) LTD.

VALE PLACE WORKS, HANLEY, STAFFS.



You can rely on a Howells Motor

LONDON: Palmers Green 5428. **BIRMINGHAM**: Central 7909.
MANCHESTER: Didsbury 4709. **STOKE-on-TRENT** 29624.
BRISTOL 43409.

BRITANNIC CABLES

AN INDEPENDENT COMPANY, MAKERS OF E.H.T.
AND L.T. PAPER MAINS CABLES, VARNISHED CAMBRIC
C.T.S. MINING TRAILING, "IVERITE" INSULATED CABLES

BRITANNIC ELECTRIC CABLE & CONSTRUCTION CO. LTD. IVER BUCKS
Telephone: IVER 491 Telegrams "BRITANNIC, IVER"

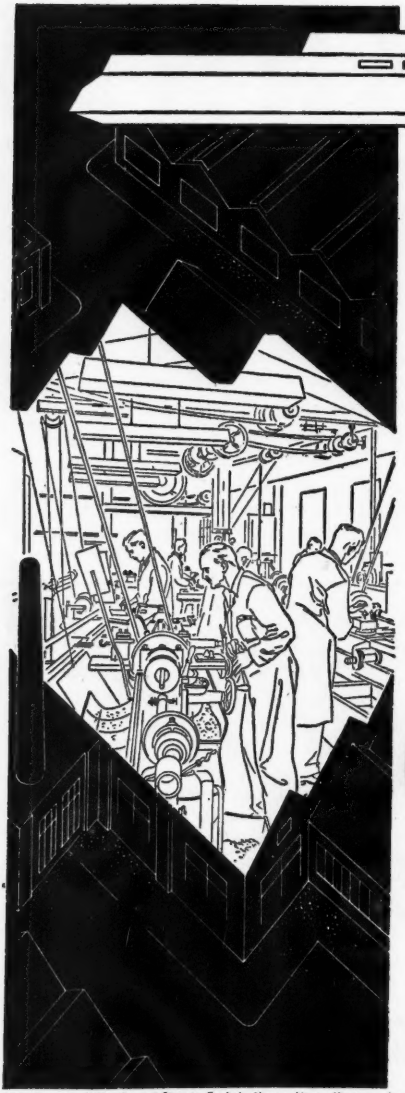
MOTORS

Fractional H.P. and Geared Motor Units. Synchronous Motors. Unique features and an unlimited range. 25 years' leadership!

KLAXON LTD 201 HOLLAND PARK AVENUE, LONDON, W.11

INDUSTRIAL & MARINE WARNING SIGNALS

Indispensable to safety and efficiency ashore and afloat. ALL signalling problems solved.



The faster, the sooner . . .

The faster the pace, the sooner will the destination be reached, whether in the construction or the flying of aircraft; the building up of armaments or the winning of the war with them.

Any aid to speedy and steadily maintained production is worthy of close study.

The Osram Fluorescent Tube is doing important war work, stepping up efficiency, easing the strain on workers, helping to increase output—by its cool, glareless, natural light.

The light is spread evenly over a tube 5-ft. long and 1½-in. diameter resulting in high quality of diffusion and absence of shadows for fine work. The colour of the light approximates to noon sunlight. Energy is never wasted under the light of OSRAM Fluorescent Tubes.

Osram

FLUORESCENT TUBES

A G.E.C. PRODUCT

Advertisement of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2